

# Post Opening Project Evaluation

## A3 Hindhead - Five Years After

August 2017



### Notice

This document and its contents have been prepared and are intended solely for the Highways England's information and use in relation to the Post Opening Project Evaluation of Major Schemes.

Atkins assumes no responsibility to any other party in respect of or arising out of or in connection with this document and/or its contents.

---

*Although this report was commissioned by Highways England, the findings and recommendations are those of the authors and do not necessarily represent the views of the Highways England. While Highways England has made every effort to ensure the information in this document is accurate, Highways England does not guarantee the accuracy, completeness or usefulness of that information; and it cannot accept liability for any loss or damages of any kind resulting from reliance on the information or guidance this document contains.*

---

# Table of contents

<b>Chapter</b>	<b>Pages</b>
<b>Executive summary</b>	<b>4</b>
Scheme description	4
Objectives	4
Summary of Scheme Impacts	4
<b>1. Introduction</b>	<b>7</b>
Overview of POPE	12
Report Structure	13
<b>2. Traffic Analysis</b>	<b>14</b>
Introduction	14
Sources	14
Traffic Volumes	16
Observed Flows	18
Journey Times	31
Journey time reliability	35
<b>3. Safety</b>	<b>38</b>
Introduction	38
Changes in Collision Numbers	40
Forecast vs. observed change in collisions	47
<b>4. Economy</b>	<b>54</b>
Introduction	54
Sources	54
Forecast Present Value Benefits	54
Journey Time Benefits	55
Safety Benefits	58
Scheme Costs	61
Benefit Cost Ratio	64
Wider Economic Impacts	65
<b>5. Environment</b>	<b>67</b>
Noise	72
Local Air Quality	74
Greenhouse Gases	75
Landscape	76
Townscape	87
Cultural Heritage and Archaeology	87
Water Quality and Drainage	94
Physical Fitness	97
Journey Ambience	101
<b>6. Accessibility and Integration</b>	<b>106</b>
Accessibility	106
Option Values	106
Access to the transport system	107
Severance	107
Integration	109
<b>7. Conclusions</b>	<b>111</b>
Scheme specific objectives	111

<b>Appendices</b>	<b>112</b>
<b>Appendix A. Appraisal Summary Table (AST) and Evaluation Summary Table (EST)</b>	<b>113</b>
<b>Appendix B. Environmental Data</b>	<b>116</b>
B.1. Environmental documents received	116
<b>Appendix C. Glossary</b>	<b>117</b>
<b>Appendix D. Tables and Figures in this Report</b>	<b>120</b>

# Executive summary

## Scheme description

The A3 Hindhead scheme is a Highways England major scheme which opened to traffic in July 2011, situated on the A3 which is the main connecting road between London and Portsmouth. Prior to the scheme's completion, four miles in the area of Hindhead were single carriageway. This scheme created a bypass to the village of Hindhead including a 1.2 mile twin bored tunnel. The A3 is now a high standard dual carriageway road for its entire length from the M25 to the A3(M) in Portsmouth.

## Objectives

Scheme Objectives <i>Source: Statement of Case (May 2004)</i>	Objective Achieved?
Improve journey time reliability for users of the A3 and other roads.	✓
Improve Hindhead through the substantial reduction in through traffic and rat running on minor roads leading to improved local air quality, less noise, reduced severance of communities.	✓
Reduce the number of collisions.	✓
Remove the route of the A3 through the historic landscape of Hindhead Common and the Devil's Punch Bowl Site of Special Scientific Interest (SSSI) giving substantial environmental benefits for biodiversity and for visitors.	✓ <sup>1</sup>
Minimise adverse environmental impacts including that to Wealden Heaths Phase 2 Special Protection Area such that there is an overall a slight beneficial impact on the Surrey Hills Area of Outstanding Natural Beauty (AONB).	✓

## Summary of Scheme Impacts

### Key Findings

- Average two way weekday traffic flows on the new A3 have increased by around 59%, with around 50,000 vehicles observed on the A3 north of the A3 tunnel and 42,000 to the south of the A3 scheme. There are around 10,000 (29%) more vehicles than forecast using the A3 to the north of the scheme.
- Traffic flows on the old A3 de trunked route have approximately halved (reduced by between 9,000 and 14,000 vehicles) since the scheme opened.
- Large journey time savings have been observed in all time periods and both directions, with the greatest savings observed on the A3 in the AM peak London-bound direction, by around 24 minutes.
- Since the scheme opened, annual collision numbers have reduced by 5.6 collisions (annual average) in the wider area (stretching from Farnham to Haslemere) and by 17.4 collisions in the scheme area. The appraisal expected the savings to be largely on the scheme section as opposed to the wider area, which is in line with the observed results.
- Post opening environmental impacts, in relation to forecast impacts, are mixed, with townscape, physical fitness, journey ambience and heritage of historic resources all delivering as expected impacts. Impacts on landscape, biodiversity and water environment are worse than expected. This is respectively due to gorse threatening new planting, planting being worse than expected impacting biodiversity, and limited maintenance of the pond sites.

<sup>1</sup> Issues around maintenance, lack of establishment of heathland and gorse growth impacting new planting remain.

- The scheme delivers an outturn benefit cost ratio of 2.2 (high value for money) which is better than the forecast benefit cost ratio of 2.0 (also high value for money). This is largely due to journey time benefits being greater than expected as a consequence of traffic volumes being higher than expected.

### Traffic

- Following the scheme opening, average weekday traffic flows have increased on the A3, with an increase of 59% to the north of the tunnel where two way weekday flows are now just over 50,000 vehicles per day. South of the scheme shows a similar pattern with an increase of 68%, which is the equivalent of around 17,000 additional vehicles per day.
- There is a reduction in traffic on minor roads in the vicinity of the tunnel which no longer have direct access to the A3. Flows on the old A3 have approximately halved (reduced by between 9,000 and 14,000 vehicles) since the scheme opened.
- Five years after the scheme's opening, traffic flows on the new A3 are 29% (around 10,000 vehicles) above the level forecast. This trend is contrary to most of the changes in traffic observed on all other roads in the local area and it is therefore likely that following the scheme opening, more strategic traffic is using the A3.
- This increase may indicate that the modelling underestimated wider area re-routing. It is likely that this is related to how the model predicted the attractiveness of the route would impact flows, rather than due to the model size.
- Large journey time savings are observed in all time periods and in both directions, with the greatest savings on the scheme section of the A3 in the AM peak London-bound direction, by around 24 minutes (50%).
- Journey times for traffic in the opposite direction in the PM peak have reduced by almost seven minutes (30%).

### Safety

- Annual average collision numbers have reduced by 5.6, within a wide area stretching from the Farnham (A31) to Haslemere after taking into account the widespread safety improvement trends observed over the same time period, which is a 2% reduction. This saving is not statistically significant and is likely to have occurred without the implementation of the scheme.
- In the scheme area there has been a reduction of 17.4 collisions annually, which is a 50% reduction when compared to the before period. This saving is statistically significant thus is likely to have occurred as a result of the scheme.
- The majority of the collision savings have been in the immediate vicinity of the scheme, in line with predictions. The overall net savings, however, are lower than predicted.
- Collision rates have reduced close to the scheme, indicating that the increase in traffic using the A3 has not had a detrimental impact on safety.

### Environment

- Based on traffic flows, it is likely that local noise impacts are generally better than expected or as expected since traffic flows have reduced more than predicted on the former A3, whilst traffic on the A3 is higher than predicted but within the limitation for an as expected evaluation.
- Based on traffic flows along the A3 and its connecting routes, it is likely that there has been an improvement in air quality in some areas, neutral in others, and a significant worsening for two routes including the A3 new alignment.
- Planting in the Devil's Punch Bowl is not at the growth level or species diversity and colonisation expected at Five Years After (FYA). Planting along the old alignment between Hazel Grove Junction and Hammer Lane minor underpass has progressed well, although gorse is threatening this growth in some areas. Woodland planting along the new A3 alignment is showing good growth in most areas. However, gorse is colonising large areas of the soft estate and appears to be unmanaged resulting in a worse than expected impact on landscape.
- New habitats of woodland, scrub, hedgerow and heather, wet flush and species-rich grassland have been created as part of the landscaping works as expected. Overall, there is a mixed success on species monitored as a part of the aftercare programme with positive effects on dormice and breeding birds and negative effect on invertebrates and reptiles. Overall, planting is considerably worse than expected along the former A3 and new A3 alignment impacting on habitat as a whole. There is a deterioration in the quality of the habitat, mainly due to soil pH,

trampling and establishment of Gorse resulting in an assessment of worse than expected for biodiversity.

- Ponds appear to not be receiving vegetation maintenance which could compromise the effectiveness of their primary drainage function.

### Accessibility and Integration

- The impact of the scheme on accessibility and integration sub-objectives are as expected.

## Summary of Scheme Economic Performance

All monetary figures in 2002 Prices and values		Forecast (£)	Outturn re-forecast (£)
Indirect tax revenue as cost	Journey times (including maintenance delay)	643.5	808.8
	Vehicle Operating Cost (VOC)	-28.5	-40.7
	Safety	113.0	5.2
	<b>Total</b>	<b>727.6</b>	<b>773.3</b>
	Present Value Costs (includes indirect tax revenue)	345.3	325.3
	<b>Benefit Cost Ratio (BCR)</b>	<b>2.1</b>	<b>2.4</b>
Indirect tax revenue as a benefit	Journey times (including maintenance delay)	643.5	808.8
	VOC	-28.5	-40.7
	Indirect tax revenue	31.6	45.1
	Safety	113.0	5.2
	<b>Total</b>	<b>759.6</b>	<b>818.4</b>
	Present Value Costs	376.9	370.5
	<b>Benefit Cost Ratio (BCR)</b>	<b>2.0</b>	<b>2.2</b>

### Costs and Benefits

- The cost of construction of the scheme was £316 million in 2002 prices; 2% lower than predicted.
- Long term costs for the scheme include tunnel operation, maintenance, and refurbishment for the tunnel for 60 years. These costs are valued in the same way as the long-term benefits through conversion to present value, equating to £54.9 million. The long-term cost of the scheme, from construction to end, including 60 years of maintenance, is therefore £325.3 million (including indirect tax as a cost).
- With indirect tax treated as part of the costs, as per the original appraisal, the outturn assessment shows that the scheme will deliver £773.3 million of present value benefits (in 2002 values) over the 60-year scheme life. The outturn result is larger than the forecast benefits primarily due to the outturn journey time benefits being larger than expected as a result of higher than forecast traffic volumes. This result is despite the outturn safety benefits being lower than forecast.
- The assessment of indirect tax and Vehicle Operating Costs (VOC) are very similar, thus when both are treated as part of the benefits, the overall net outturn impact is around £4 million.
- The combined outcome of higher than forecast benefits and lower than forecast costs is a reforecast BCR that is better than expected. The appraisal forecast that the scheme would deliver a BCR of 2.0 (representing high value for money). When indirect tax is considered as part of the cost, the outturn assessment shows that the scheme is delivering a BCR of 2.2 (also representing high value for money).

# 1. Introduction

- 1.1. This report is a Five Years After (FYA) opening evaluation study of the A3 Hindhead scheme which opened to traffic in July 2011. The evaluation has been prepared as part of Highways England's post opening project evaluation (POPE) programme. This report builds upon the findings of the One Year After (OYA) POPE study.

## Scheme Context

- 1.2. The A3 is a strategic route, as the main regional connecting road between London and Portsmouth, passing through environmentally sensitive areas including the Surrey Hills Area of Outstanding Natural Beauty (AONB). The location of the scheme is summarised in Figure 1.1.

Figure 1.1 - Location of scheme

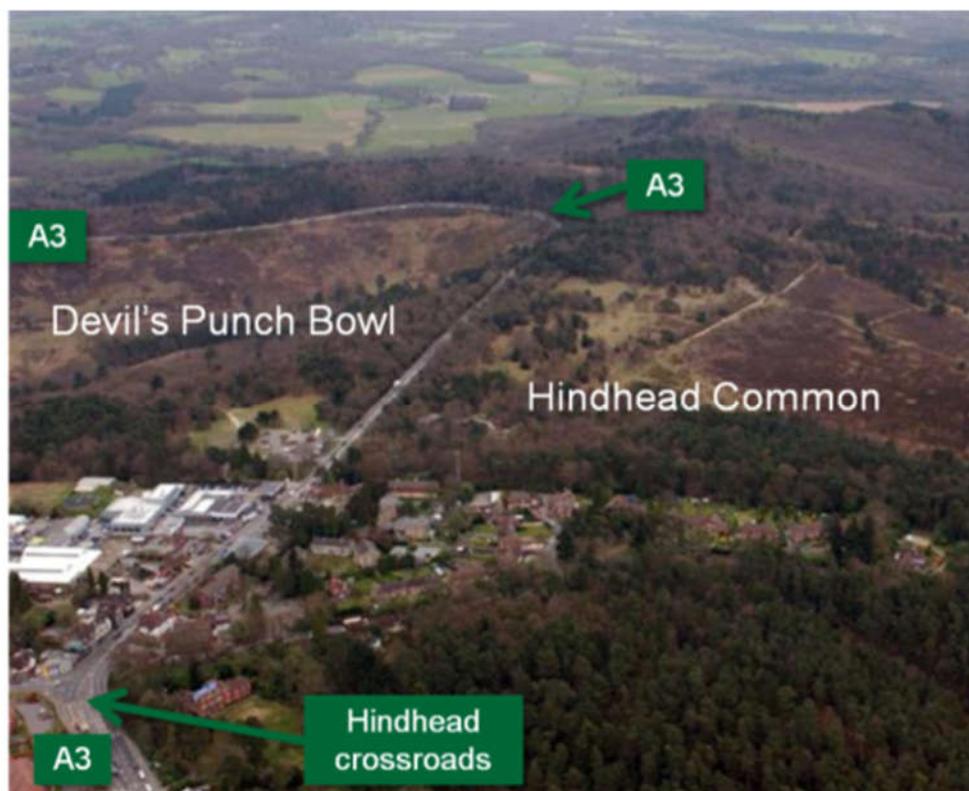


- 1.3. Prior to the completion of this scheme, the only section of the A3 which was not a high standard dual carriageway road was in the area of Hindhead, where the A3 was single carriageway only. The A3 climbed around the rim of the Devil's Punch Bowl, a well-known National Trust beauty spot and Site of Scientific Interest (SSSI). At this location, the A3 had poor horizontal and vertical alignment with restricted visibility. Traffic on the A3 in the Devil's Punch Bowl also caused negative impacts on the environment.
- 1.4. The non-technical summary produced in the appraisal of this scheme prior to its approval noted that the scheme section pre-scheme carried around 28,400 vehicles on an average day of which about 10% were heavy goods vehicles (HGVs), which was above the normal flow range for a single carriageway.
- 1.5. Prior to the scheme, there were substantial delays and journey time variability on the A3. This was particularly evident at the signal-controlled crossroads with the A287 at Hindhead, as well as the several junctions and private accesses south of Hindhead, which caused conflicts between local and through traffic. As a result, significant amounts of traffic would

divert to other local roads, including unsuitable country lanes. The high traffic flows and congestion also created access problems for the local communities and businesses, as well as environmental issues, with noise and air quality problems in Hindhead and Grayshott.

- 1.6. The road also had a high collision rate, with serious collisions causing closure of the entire road for several hours.
- 1.7. Figure 1.2 shows an aerial view of the route of the A3 before construction of this scheme.

**Figure 1.2 - Aerial view of route of A3 in 2007, before start of construction**



© GeoPerspectives

## Scheme Description

- 1.8. This scheme created a dual two-carriageway bypass to the village of Hindhead, including a twin-bored tunnel. Figure 1.3 and Figure 1.4 show the key features of the scheme with the main changes summarised as follows:
  - 6.5km (4 miles) of new dual carriageway.
  - 1.9km (1.2 miles) twin bored tunnel under Hindhead Common and the Devil's Punch Bowl.
  - Eight new bridges crossing the A3 of various types, including a junction with A3 with vehicle overbridge at Hazel Grove, south of the tunnel. This junction permits all turning movements on and off the A3 which existed on the former route and crossing over the A3 via the overbridge.

Figure 1.3 - Key features of scheme

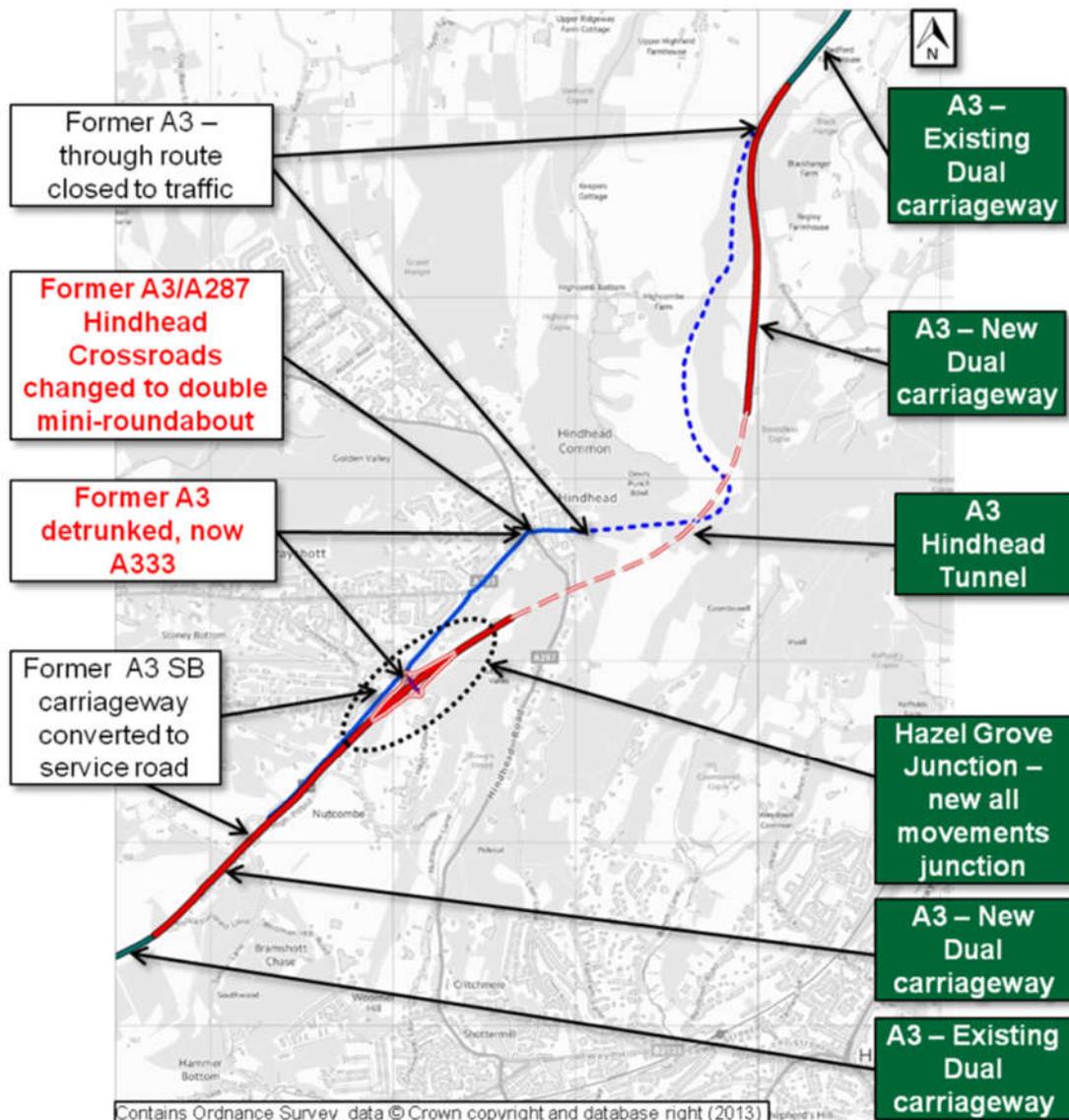
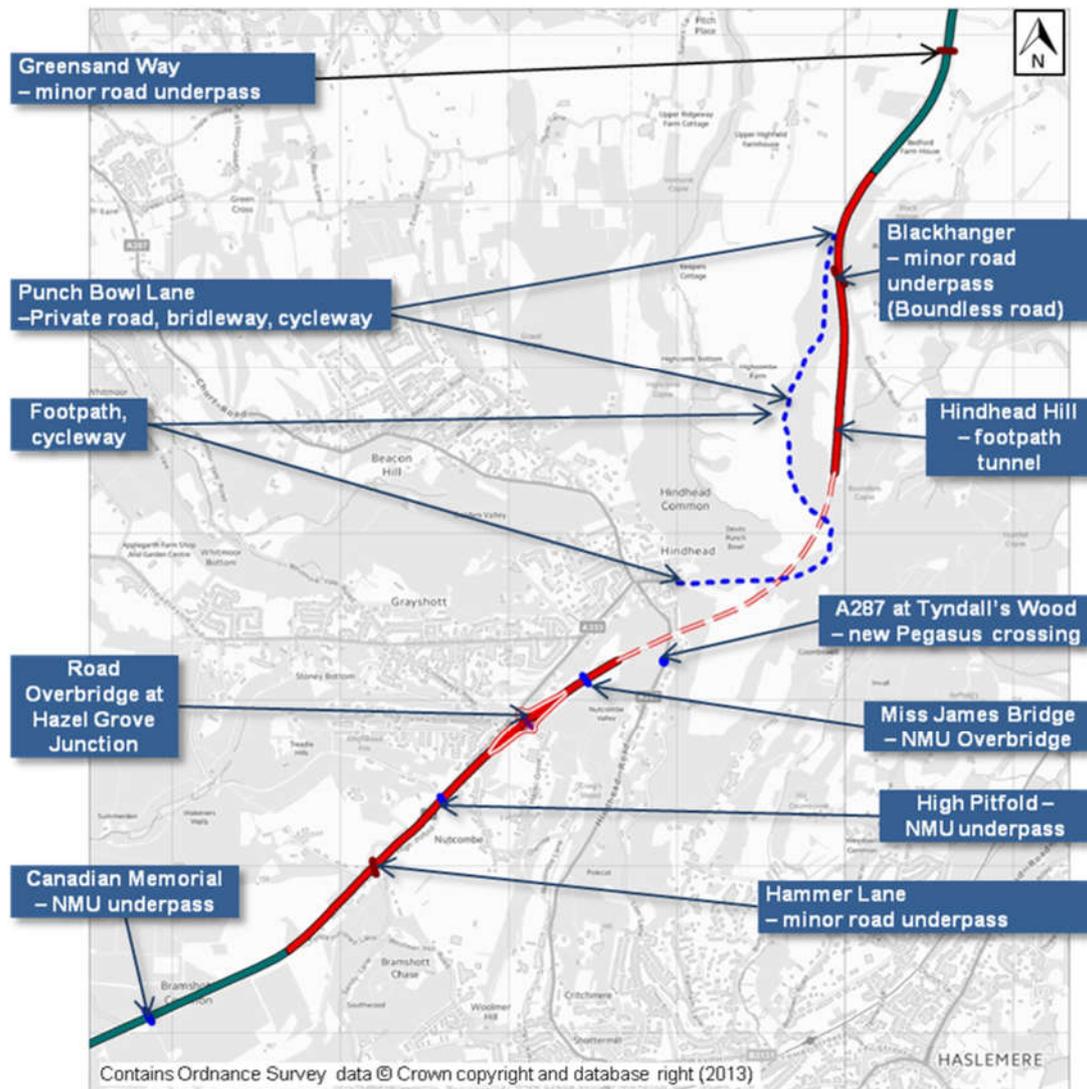


Figure 1.4 - Features of scheme for non-motorised users (NMUs)



1.9. Locations of new structures crossing the A3 from north to south are:

- **Greensand Way** – underpass for access road and public footpath.
- **Blackhanger Underpass (Boundless Road)** – minor road underpass.
- **Hindhead Hill** – tunnel for public footpath (FP 94) 1km north of the northern portal of tunnel.
- **Miss James Bridge** – feature overbridge for NMUs.
- **Hazel Grove junction** – dumbbell style all movements junction linking the local road network in Hindhead and Grayshott with the A3.
- **Hammer Lane** – minor road underpass.
- **High Pitfold** – NMU underpass suitable for equestrians.
- **Canadian Memorial underpass at Bramshott Common** – gap closure and construction of new underpass for Ministry of Defence use and NMU users.

1.10. Additionally, on the A287 Hindhead Road which now crosses above the A3 tunnel, a new Pegasus crossing<sup>2</sup> was installed at Tyndall's Wood.

<sup>2</sup> Pegasus crossing is a signalled crossing catering for equestrians in addition to cyclists and pedestrians.

1.11. Further changes to the A3 are:

- Access to the A3 north of the tunnel is via the Thursley junction which is an all movements junction which opened in 2005.
- South of Hazel Grove, the access points of the A3 have been modified as follows:
  - At **Hammer Lane**, northbound exit only.
  - **Knockhundred Lane** converted to one-way from its junction with Sandy Lane and access was modified to be limited to entry and exit from the southbound carriageway only at the location known as the **Spaniard junction** (formerly the location of a pub of that name).

1.12. The former alignment of the A3 in the urban area of Hindhead and Grayshott was altered as follows:

- Former route of A3 around the Devil's Punch Bowl was removed and restored to heathland. The route is no longer accessible for vehicle traffic for 2 miles (3.3 km).
- Crossroads at Hindhead was converted to double mini-roundabout.
- Former route of A3 south west of the crossroads to Hazel Grove junction was reclassified as the A333. This road is now no longer part of the strategic network of roads maintained by Highways England and is now maintained by the local authority. This change is termed detrunking.
- South of Hazel Grove junction to Hammer Lane the former southbound carriageway was retained as service road and traffic calmed.

## Scheme Objectives

1.13. The scheme objectives based on key points in the Appraisal Summary Table (AST) and Environment Statement (ES) can be summarised as:

- Improve journey time reliability for users of the A3 and other surrounding roads.
- Improve Hindhead village by substantially reducing through traffic and rat running on minor roads leading to improved local air quality, less noise, reduced severance of communities.
- Reduce the numbers of collisions.
- Remove the route of the A3 through the historic landscape of Hindhead Common and the Devil's Punch Bowl SSSI giving substantial environmental benefits for biodiversity and for visitors.
- Minimise adverse environmental impacts including that to Wealden Heaths Phase 2 Special Protection Area<sup>3</sup> such that there is an overall slight beneficial impact on the Surrey Hills AONB.

## Scheme History

1.14. A brief history of the key events involved in the development of the scheme is provided in Table 1.1.

---

<sup>3</sup> Includes the Devil's Punch Bowl, as specified in the Revised scheme brief 12 December 2006.

**Table 1.1 - History of key dates**

<b>Date</b>	<b>Summary</b>
1970s, 1980s and 1990s	The need for improvements to the A3 through Hindhead was recognised and there were several studies and varying proposals put forward and public consultations undertaken. The proposal including the use of bored tunnel was selected as preferred route in 1993 but the scheme was not funded to go ahead at that time.
Early 1990s	<i>Dualling of A3 south and north of the Hindhead section at Liphook/Petersfield (1992) and the Milford bypass (1993).</i>
1997/8	Scheme considered within the roads review.
Dec 1999	A3 Hindhead Study commissioned to investigate options including tolling.
2001	A3 Hindhead Improvements scheme added to roads programme, without tolling.
2002	Contractor appointed via Early Contractor Involvement (ECI).
2003	Forecasting reports published.
Sept 2004 – Feb 2005	Public Inquiry.
2005	<i>(A3 Thursley junction completed, just north of Hindhead scheme).</i>
July 2006	Inspectors report published.
<b>Jan 2007</b>	<b>Start of works.</b>
April 2007	Online construction starts.
<b>July 2011</b>	<b>Scheme fully opens.</b>

## Overview of POPE

- 1.15. Highways England are responsible for improving the strategic highway network (motorways and trunk roads) through the Major Schemes programme. At each key decision stage through the planning process, schemes are subject to a rigorous appraisal process to provide a justification for the project's continued development.
- 1.16. When submitting a proposal for a major transport scheme, the Department for Transport (DfT) specifies that an AST is produced which records the degree to which the five Government objectives for Transport (Environment, Safety, Economy, Accessibility and Integration) have been achieved. The contents of the AST allow judgements to be made about the overall value for money of the scheme. The AST for this scheme is presented in Appendix A of this report.
- 1.17. POPE studies are carried out for all Major Schemes to evaluate the strengths and weaknesses in the techniques used for appraising schemes. This is so that improvements can be made in the future. For POPE, this is achieved by comparing information collected before and after the opening of the scheme, against predictions made during the planning process. The outturn impacts of a scheme are summarised in an Evaluation Summary Table (EST) which summarises the extent to which the objectives of a scheme have been achieved. The EST for this scheme can also be found in Appendix A of this report.

## Summary of A3 Hindhead OYA Opening Study

- 1.18. The purpose of this FYA study is to verify and undertake a more in-depth analysis of the emerging trends and conclusions from the OYA study. The main conclusions reported in the A3 Hindhead OYA evaluation study were as follows:
- Weekday traffic on the A3 north of the new tunnel increased by around 40,000 vehicles per day (vpd), an increase of 27% compared with traffic before the start of construction.
  - Large journey time savings were observed on the A3 for all time periods surveyed with the greatest journey time savings in the AM peak London-bound at 27 minutes. The return westbound traffic in the PM peak showed savings of nearly seven minutes. There were also journey time savings for the A3 traffic on Sunday afternoons.

- On the key links, the injury collision rate dropped by almost two-thirds following the opening of the scheme, a similar proportional drop to that predicted, even taking into account the national reduction over the same time period.

## Report Structure

1.19. The structure of this report is as follows:

- **Chapter 2** - Traffic Analysis
- **Chapter 3** - Safety
- **Chapter 4** - Economy
- **Chapter 5** - Environment
- **Chapter 6** - Accessibility and Integration
- **Chapter 7** - Conclusions
- **Appendix A** – Appraisal Summary Table and Evaluation Summary Table
- **Appendix B** - Environmental Data
- **Appendix C** - Glossary
- **Appendix D** - Tables and Figures listed in this report

## 2. Traffic Analysis

### Introduction

- 2.1. This section examines traffic data from a number of sources to provide before, OYA opening and FYA opening comparison of traffic flows and journey times on the A3 and other roads in the vicinity. The purpose of this evaluation is to understand whether changes in traffic flows and journey times may be attributable to the scheme.
- 2.2. The traffic analysis section includes:
- An assessment of long term traffic volume trends on the A3 in the scheme area to provide a context against which observed changes in traffic flow can be considered.
  - Comparison of observed before, OYA opening, and FYA opening traffic data on the A3 scheme section, old A3 (now known as A333) and the surrounding road network in the immediate vicinity of the scheme and over a wider area.
  - Assessment of the observed traffic flows and forecast traffic flows to identify whether traffic flow changes are as expected.
- 2.3. The journey time analysis section covers:
- Comparison of journey times before and after opening on key sections of the A3.
  - Evaluation of key differences between observed changes in journey times on the A3 with that forecast as part of the scheme appraisal, to understand whether the scheme has delivered the expected impact.

### Sources

#### Traffic count data

- 2.4. Traffic flows have been measured by Automatic Traffic Counters (ATC). This data was obtained before scheme opening (March 2007), OYA scheme opening (October 2012) and FYA scheme opening (October 2016). This data was obtained from the following sources:
- Highways England permanent ATCs taken from WebTRIS.
  - Local Authority ATC sites (Hampshire, Surrey and West Sussex County Councils).
  - Temporary ATCs commissioned for this study to complete the gaps and enable comparisons with sites used in the traffic forecasting.
  - Flow data for sites located at the entrance to the tunnel provided by the operator.
- 2.5. A list of count site locations is provided in **Table 2-1**.

**Table 2-1 - Site locations**

Source	Site Reference	Description	
Surveys	C	Former A3, E of crossroads	
	D	Former A3 between Tower Rd and B3002 Headley Rd	
	E	Former A3 between jct with new A3 and B3002 Headley Rd	
	4	A325 Wrecclesham Hill	
	5	A31, Bentley Bypass	
	6	A287 Hindhead Rd, S of A3	
	7	A286 Grayswood Rd	
	8	A283 Cripplecrutch Hill	
	9	A281 Horsham Rd	
	10	A287 Churt Rd	
	12	B3002 Headley Rd, E of Crossways Rd	
	14	Crossways Rd, SE of Headley Rd	
	15	Crossways Rd, NW of A3	
	16	B3004, Headley Road	
	17	Church Rd, N of A3	
	19	B3002 Headley Rd, W of A3	
	20	Tower Rd, Hindhead	
	21	A287 Tilford Rd, N of former crossroads with A3	
	22	Hazel Grove, S of A3	
	23	High Pitfold, W of Hazel Grove	
	24	Hammer La, S of A3	
	26	Knockhundred La, S of A3	
	27	A272, W of A3	
	28	B2131, Linchmere Road	
	29	B2131, London Road	
	30	Tilford Rd, N of Hyde La	
	31	Thursley Rd, S of Dyehouse La	
	WebTRIS	1	M3 Junction 7-6
		2	M3, Junction 6-5
		3	M3, Junction 5-4a
		A	A3, within Thursley Junction
F		A3 between A325 and B2171	
H		A3 north of Petersfield, between A272 and B3006	
G		A3 between B3006 and A325	

## Journey times

2.6. Journey time surveys at the FYA evaluation stage have been undertaken on two routes as illustrated later in this section, in Figure 2.10. These comprise the A3 including the new route created by the scheme. These surveys were carried out as follows:

- **Before construction** (March 2007): These were collected using the moving observer method. Six runs were completed in each direction in for several time periods.
- **FYA opening** (November 2015-October 2016): These were collected from satellite navigation data<sup>4</sup> over a 12-month period (1/11/2015-31/10/16).

2.7. The scheme's appraisal indicated that it was expected to have an impact on traffic route choice on a number of other roads in the local and wider area. As a result, in addition to the

<sup>4</sup> Satellite navigation data is collected anonymously from vehicles using the route and provides a greater sample size than the moving observer. In this study is has only been used for the post opening period because the before construction period is too early for suitable satellite navigation data to be available.

two routes detailed above, surveys were completed for four further routes. At the FYA evaluation stage, these surveys have not been repeated as the findings at OYA demonstrated that the scheme had delivered a minor impact on journey times on the additional routes.

## Traffic Volumes

2.8. Historically for some POPE scheme evaluations, the before construction period counts have been factored to take account of background traffic growth so that they are directly comparable with the 'after' counts. However, in light of the economic climate, which has led in recent years to widespread reductions in motor vehicle travel in the UK as a whole since 2008, it is no longer deemed appropriate to use this method of factoring before period counts to reflect background changes in traffic. Rather, recent POPE studies have taken a more considered approach to assess changes in the vicinity of the scheme, within the context of national, regional and locally observed background changes in traffic.

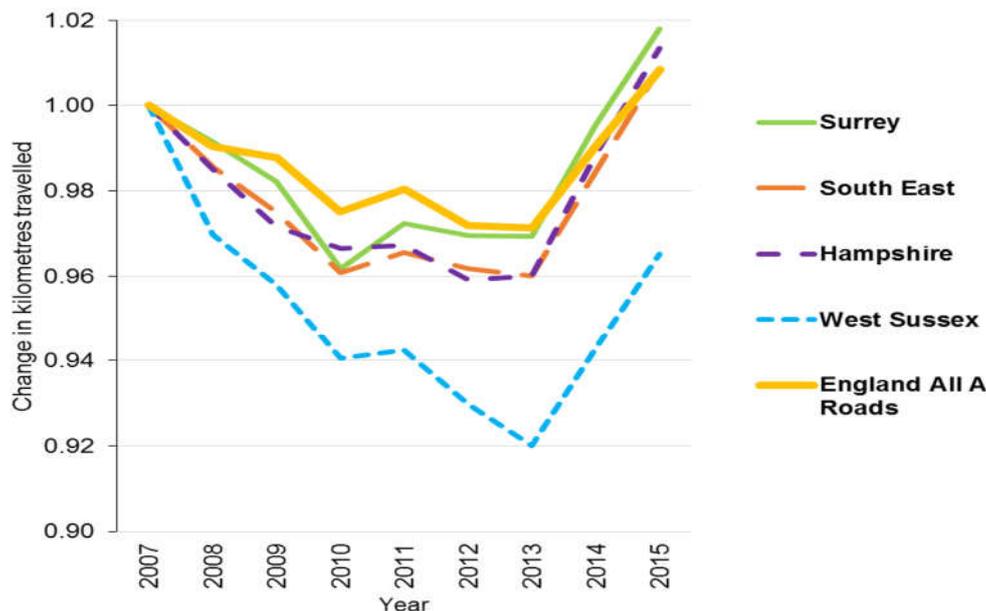
### National and regional traffic trends and long term trend on A3

2.9. The DfT produces observed annual statistics for all motor vehicles in terms of distances travelled. These are reported by road types for Great Britain and by region<sup>5</sup>. Here the proportional changes by year since 2007 are presented, the year construction of this scheme was started, and in particular:

- National data for Highways England managed A road (national data).
- Regional data for the South-East England and the counties areas near the scheme: Surrey, Hampshire and West Sussex.

2.10. Figure 2.1 displays this information while Figure 2.2 shows a graph of the long-term trend of traffic on the A3, south of the scheme, shown against the trend on the south-east England.

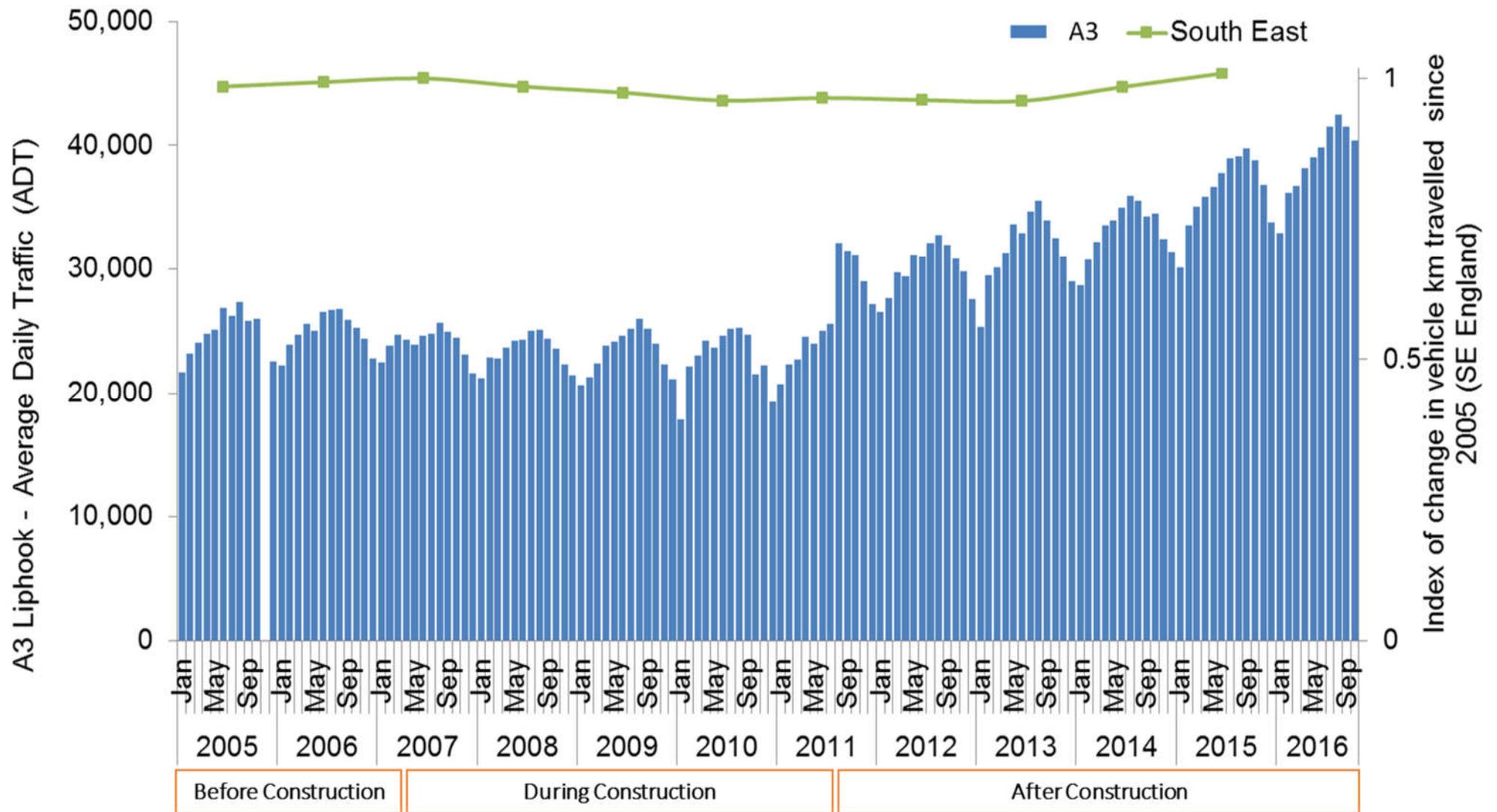
**Figure 2.1 - Regional and national traffic flow trends since start of construction (2007)<sup>6</sup>**



<sup>5</sup> Road Traffic and Speeds (<http://www.dft.gov.uk/pgr/statistics/datatablespublications/roads/traffic>). Table TRA8904. Motor vehicle traffic (vehicle kilometres) by local authority in Great Britain, annual from 1993.

<sup>6</sup> Sources: DfT statistical tables TRA 8904, TRA 4112.

Figure 2.2 - Long term trend in traffic flow on A3 (south of scheme), before, during and after construction of A3 Hindhead scheme



2.11. It can be seen from Figure 2.1 and Figure 2.2 that:

- Since 2013 there has been an increase in traffic flows in the counties near the scheme, the South East region and nationally. This shows the background trends which are linked to economic trends during that time period.
- Opening of the A3 Hindhead scheme at the end of July 2011 is clearly visible in Figure 2.2 where there is a large increase in traffic from August 2011 onwards. This trend continues on the A3, with year on year growth.
- Traffic on the scheme post opening has increased, in line with the regional figure for traffic on Highways England managed A roads in the South East, there has been a small amount of background growth of around 2% between 2007 and 2015.

## Observed Flows

2.12. This section of the report uses data from a variety of sources to inform the before and after analysis of changes in traffic volumes for the scheme and surrounding area. To complete this evaluation, traffic flow data has been compared for before construction, OYA and FYA.

2.13. Average Weekday Traffic (AWT) flows have been compared for the before construction and after construction periods. Figure 2.3 presents the AWT flows on the scheme and on roads in the immediate vicinity and Figure 2.4 presents AWT flows for the wider area.

## Scheme and local area

2.14. The key points to note from Figure 2.3, which shows traffic flows on the scheme and in the immediate vicinity, are as follows:

- Flows on the A3, north of the tunnel (Site B) have increased by 59% (18,600 vehicles). Average weekday flows are just over 50,000 vehicles per day (vpd).
- Traffic throughput at the former Hindhead Crossroads (total for Site C, D, 6 & 21) has reduced by 50% from 40,000 vpd before opening to 20,000 vpd FYA opening. This is due to the reductions on the old A3 (Site C and D) of approximately 50%, which is slightly offset by the increases on the A287 of between 16% (Site 6) and 45% (Site 21).
- Most of the roads in Hindhead and Grayscott have continued to see a reduction in traffic (Sites 10,12,14,15, 19 & 20), however, flows on the A287 north of the former crossroads (Site 21) have experienced a large increase (45% - 3,800 vpd). This increase is relatively consistent with the increase shown at OYA (34% - 2,900 vpd).
- The former A3 route (now A333) south of the crossroads has traffic of around 15,000-16,500 vpd, a slight increase since OYA opening (Sites E and D).
- Before the scheme was built there were many minor roads accessing the A3 corridor. Following the scheme opening the number of access points onto the A3 has been reduced to a few locations namely:
  - Full access at Hazel Grove and Liphook junctions.
  - Limited Access at Upper Hammer Lane and Knockhundred Lane.
- At OYA the removal of access to the A3 had resulted in traffic reductions on these roads (Sites 19, 20, 22 & 23). At FYA, reductions are generally in line with those experienced at OYA, with the exception of the B3002 (Site 19) where there has been a 22% (1,500 vpd) increase in traffic flows.
- It appears that sites that provide access to the A3 continue to show increases in traffic flows at FYA, including Hammer Lane (Site 24) which provides access to and from the A3 northbound only and Knockhundred Lane (Site 26) which provides southbound access only.
- At OYA additional traffic West of Bramshott Common was able to access the A3 at the Liphook Junction (Site 29, 17) Traffic has continued to increase at this entry point.

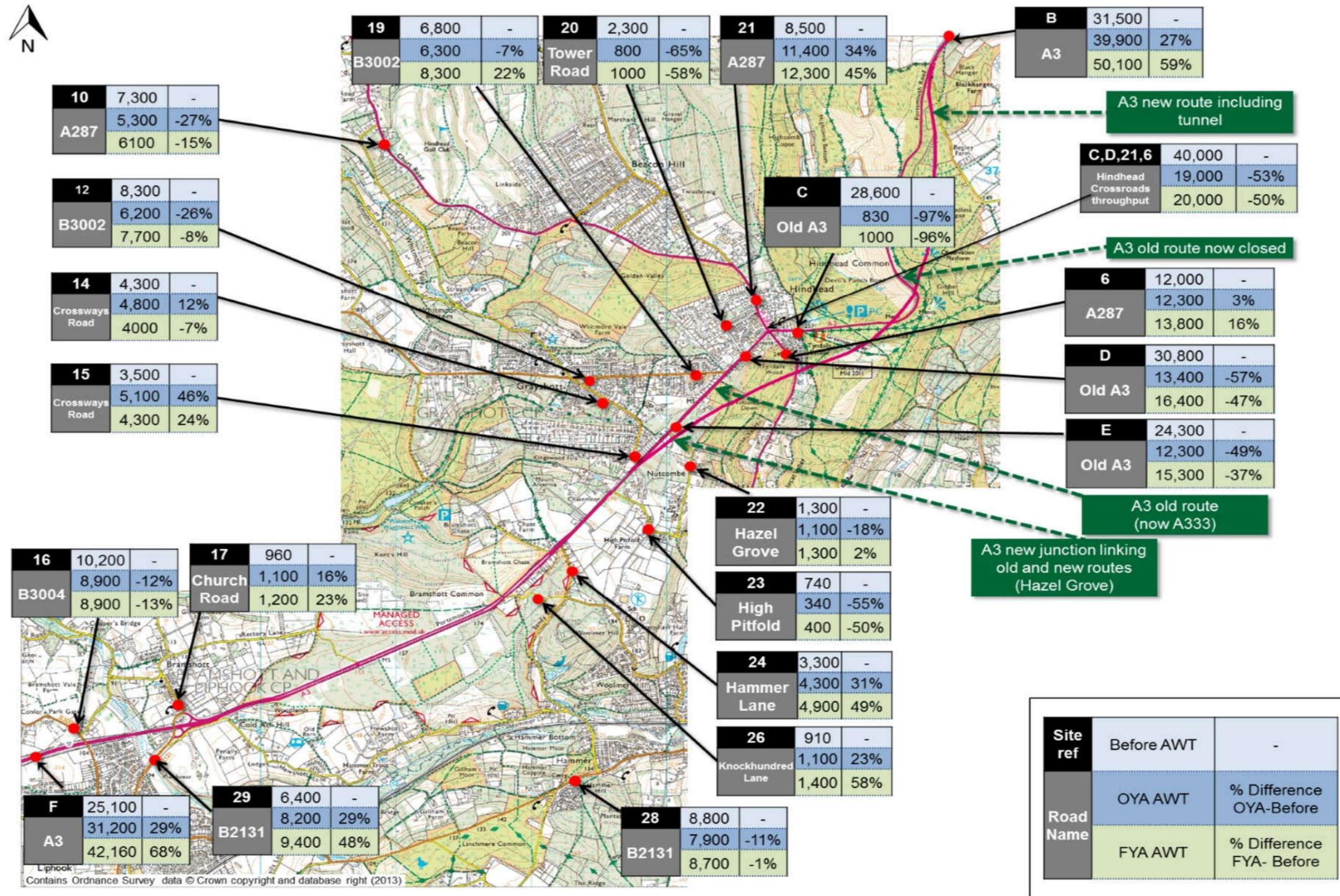
## Wider area

2.15. The most notable changes shown in Figure 2.4 are as follows:

- Traffic on the A3 has increased considerably both east and west of the scheme. The greatest level of additional traffic has now shifted to west of the scheme at Liphook junction (Site F) with increases in excess of 68% (approximately 17,000 vpd).

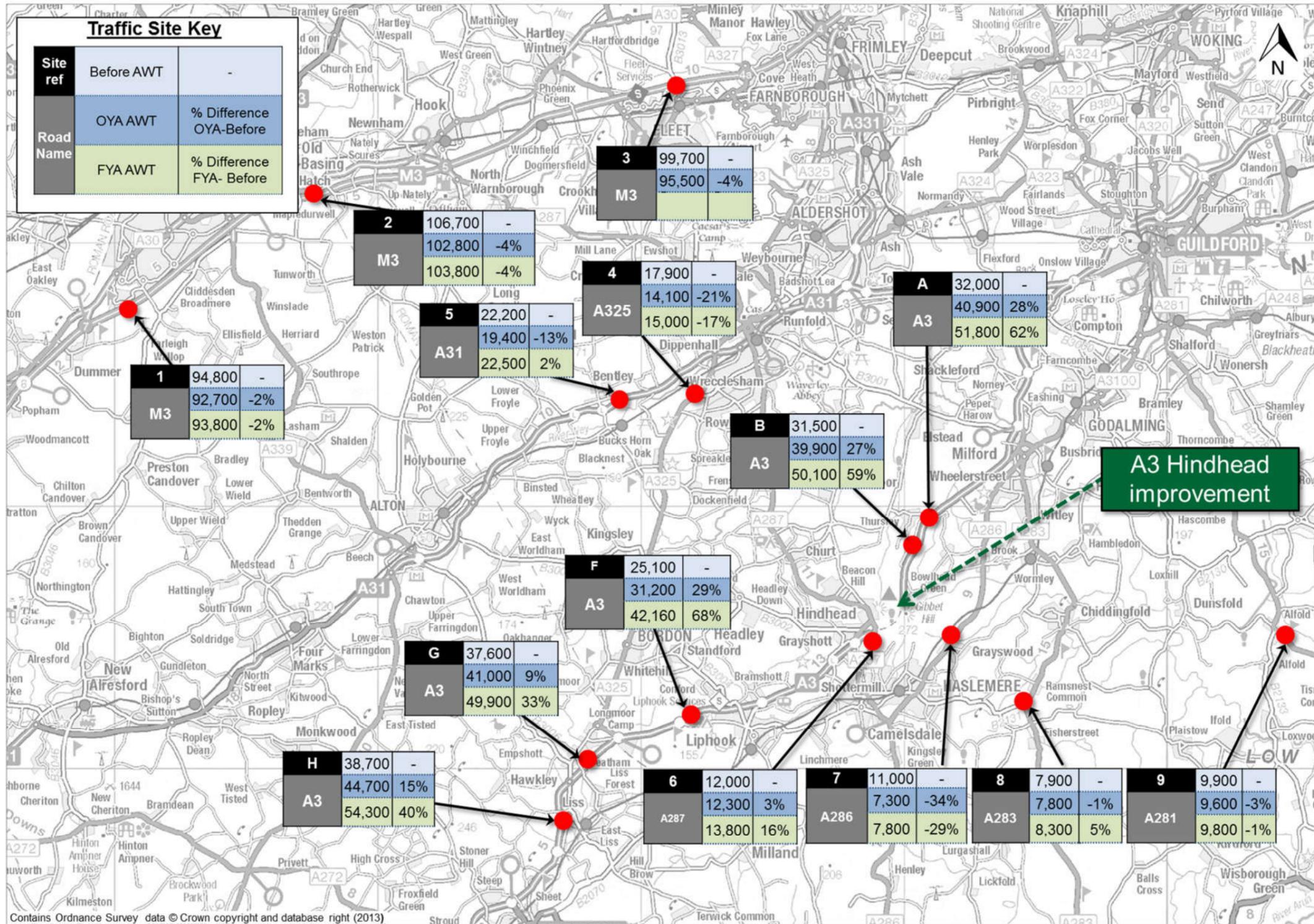
- There have been considerable increases in traffic east of the tunnel at sites A and B, compared to volumes of traffic one year after scheme opening there has been an increase of over 10,000 vehicles. This is likely to be to further re-routing onto the A3 corridor.
- Traffic levels on the surrounding A roads have remained at a fairly stable level since the scheme opened, however the A286 still shows a reduction in number of vehicles compared to before construction levels.
- Traffic on the M3 is still lower than pre-scheme levels five years after, however there is currently a major smart motorways scheme under construction between Junctions 2 and 4a on the M3 due for completion in June 2017.

Figure 2.3 - Average Weekly Traffic (AWT) - scheme and immediate vicinity<sup>7</sup>



<sup>7</sup> \*numbers may not total due to rounding

Figure 2.4 - Traffic changes in the wider area<sup>8</sup>



<sup>8</sup> Numbers may not total due to rounding; comparable data is not available at site 3 for FYA due to smart motorway works taking place at the time of writing.

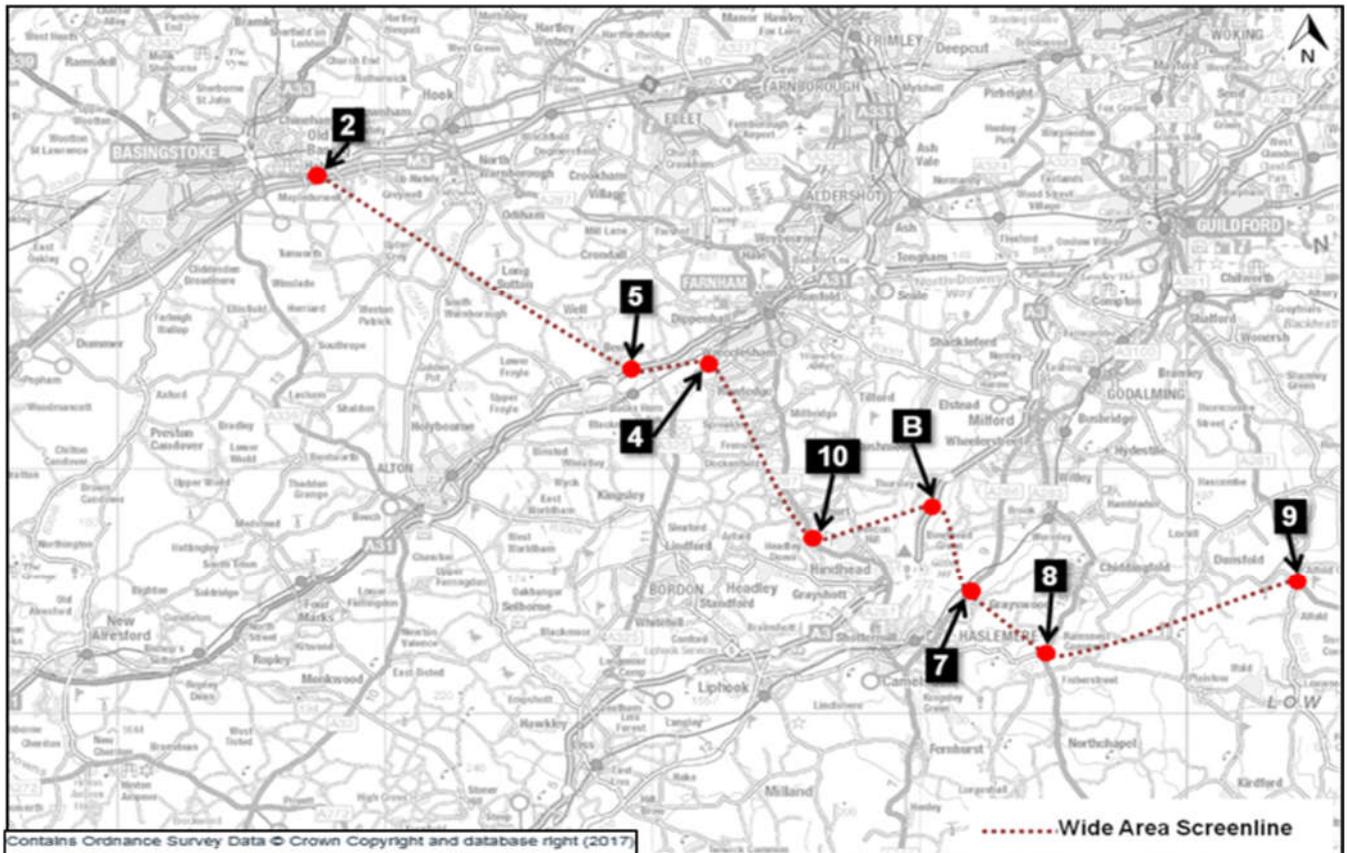
## Screenlines

- 2.16. To understand if there has been any continued reassignment as a result of the scheme FYA opening, screenline analysis has been conducted. Screenline analysis allows for a better understanding of vehicle movements across a wider corridor area by totalling the flows at a series of count sites.
- 2.17. The following three strategic screenlines have been identified for this study:
- Strategic area screenline – from the M3 in the west, crossing the A3 and extending over 30 miles.
  - Local area screenline north – roads north of the A3 corridor.
  - Local area screenline south – roads south of the A3 corridor (including former route Hindhead).
- 2.18. Note that a screenline including the old and new routes of the A3 south-west of the former crossroads has not been considered. This is because this would include double counting of traffic; closure of the old route of the A3 north-east of the former crossroads means that local traffic now accesses the A3 north via the old road south-west of the crossroads (now A333) and joins the A3 at the Hazel Grove junction.

### Strategic area screenline

- 2.19. Figure 2.5 shows the locations which make up this strategic area screenline.
- 2.20. Table 2.2 shows the AWT flows before and after scheme opening at each of the locations and sums the flows to produce a total change across the screenline.

Figure 2.5 - Location of strategic area screenline sites



**Table 2.2 - Traffic flows across the strategic area screenline**

Map Ref.	Site Name and Description	Average Weekday Traffic (AWT)			% change: before to FYA
		Before (2007)	FYA (2016)	Net difference	
2	M3, J5-6	106,700	103,800	-2,900	-3%
5	A31, Bentley Bypass	22,200	22,500	300	2%
4	A325, Wrecclesham Hill	17,900	15,000	-2,900	-17%
10	A287, Churt Rd, Churt	7,300	6,100	-1,200	-15%
B	A3, E of A287	31,500	-	19,200	62%
	A3 Hindhead Tunnel	-	50,100		
7	A286, Grayswood Rd	11,000	7,800	-3,200	-29%
8	A283, Cripplecrutch Hill	7,900	8,300	400	5%
9	A281, Horsham Rd	9,900	9,800	-100	-1%
Total		214,400	223,400	9,600	4.4%

2.21. Key points from the assessment of the changes in traffic flows over the strategic screenline shown in Table 2.2:

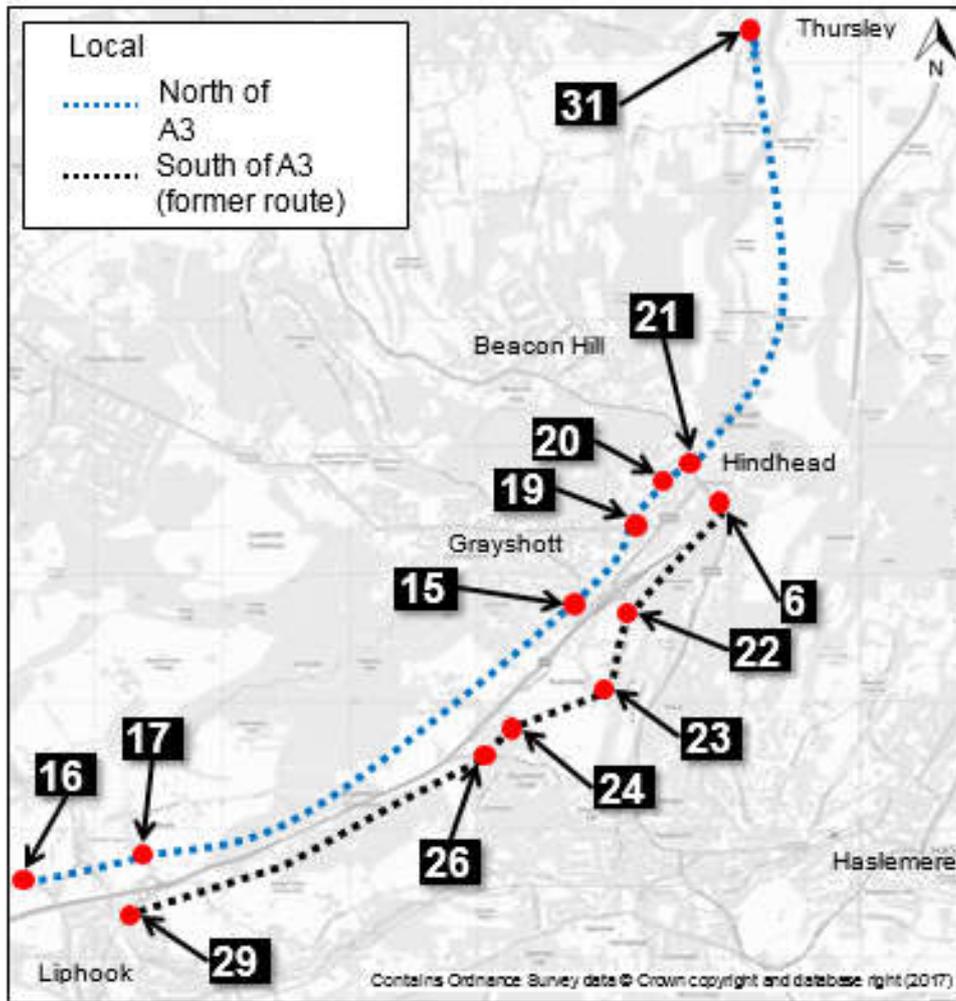
- Overall there has been a 4.4% (9,600 vpd) increase in traffic since 2007. This increase is slightly more than that seen nationally and regionally (as seen in Figure 2.1 during a similar period).
- Traffic flows on the A3 are considerably higher via the new tunnel than on the old A3, with 19,200 more vpd compared to before.
- Certain strategic routes to the west of the A3 (A287, A325 and M3 20 miles west) continue to show reductions in traffic, however traffic levels on the A31 (Site 5) are now at a similar level to before.
- Traffic flows east of the A3, on the nearby parallel road of the A286, have dropped by 29%, although there is little change on the A283 and A281.

### Local area screenlines

2.22. To examine how the opening of the scheme has changed traffic flow patterns on the roads in the A3 corridor, a local area screenline has been examined. This screenline covers the route choices for traffic accessing the A3 from the north and south, which help to identify whether more traffic is accessing the A3 locally and whether rat running patterns have changed FYA scheme opening.

2.23. Figure 2.6 shows the locations of the sites that form the screenline. The screenline comprises of two local screenlines which cover the roads accessing the A3 (former alignment) from the north and south. The traffic flow data for the screenlines is shown in Table 2.3 and Table 2.4.

Figure 2.6 - Locations of sites in local area screenlines



Local area screenline - north of A3

2.24. The weekday traffic flows on sites north of the A3 are shown in Table 2.3.

Table 2.3 - Local area screenline – north of A3

	Map Ref.	Site Name and Description (south to north)	Average Weekday Traffic (AWT)			% Change before to FYA
			Before (2007)	FYA (2016)	Difference	
Screenline North of A3	16	B3004, N of Tunbridge La	10,200	8,900	-1,300	-13%
	17	Church Rd, N of A3	960	1,200	240	23%
	15	Crossways Rd, NW of A3	3,500	4,300	800	24%
	19	B3002 Headley Rd, W of A3	6,800	8,300	1,500	22%
	20	Tower Rd, Hindhead	2,300	960	-1,340	-58%
	21	A287 Tilford Rd, N of A3	8,500	12,300	3,800	45%
	31	Thursley Rd, S of Dyehouse Rd	3,200	2,000	-1,200	-36%
		Total		32,200	38,000	2,500

2.25. Table 2.3 shows the following for the screenline between Hindhead and Liphook:

- Overall, FYA scheme opening, traffic flows have increased by 7%, compared to a negligible change at OYA. This is higher than national and regional trends for this period and suggests that extra traffic is now using the A3 corridor from the north and west via local roads.
- The largest change on this screenline is the increased traffic on the A287 (site 21). This road was formerly the north arm of the crossroads, suggesting now this route is less constrained, traffic remains on this route rather than ratrunning to the north or south to avoid a pinchpoint.
- At OYA, flows on Crossways Road, NW of A3 (site 15), had increased by 46%, however FYA traffic levels are lower than OYA levels at 24% compared to before construction levels. Traffic calming measures have been implemented on this road since the OYA report and this could explain the decrease in traffic.
- Traffic on Crossways Road (site 14 and site 15) has fallen since OYA, however this road still appears to be used a rat run from the A3.
- Traffic flows on other local roads including the B3004 (site 16), and Tower Road (site 20) have also decreased.

### Local area screenline - south of A3

2.26. The average weekday traffic flows for the sites included in the screenline south of A3 are shown in Table 2.4.

**Table 2.4 - Local area screenline – south of A3**

Screenline south of A3 (former route)	Map Ref.	Site Name and Description (south to north)	Average Weekday Traffic (AWT)			% Change before to OYA
			Before (2007)	FYA (2016)	Difference	
	29	B2131 London Rd, S of A3	6,400	9,400	3,000	47%
	26	Knockhundred La, S of A3	910	1,400	490	54%
	24	Hammer La, S of A3	3,300	4,900	1,600	48%
	23	High Pitfold, W of Hazel Grove	740	370	-370	-50%
	22	Hazel Grove, S of A3	1,300	1,300	0	0%
	6	A287 Hindhead Rd, S of A3	12,000	13,800	1,800	15%
		Total	24,700	31,300	6500	27%

2.27. Table 2.4 shows the following for the screenline south of the A3 between Hindhead and Liphook:

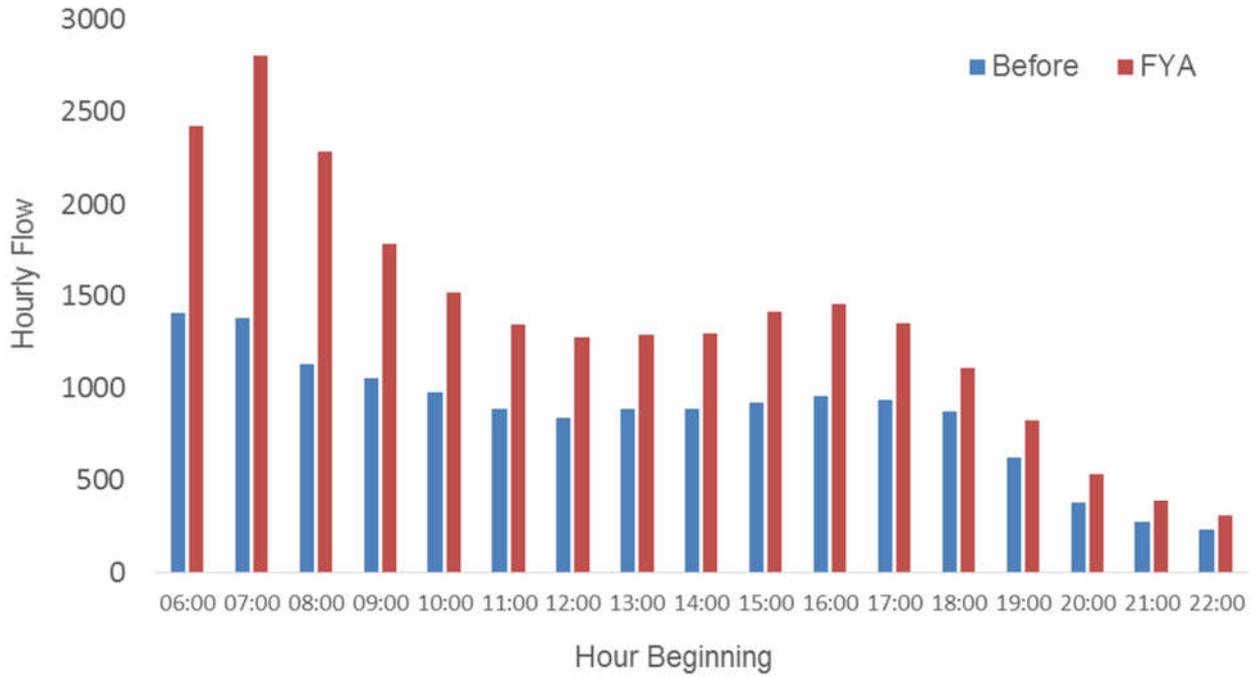
- There is additional traffic on four of these six roads south of the A3.
- The three roads with the highest proportion of extra traffic are sites 24, 26 and 29. All three sites provide access to the A3, directly at the Liphook junction (access to the A3 north only) and Hammer Lane (access to the A3 north only) and Knockhundred lane (access to the A3 south only). Traffic routing between the A3 north and locations south of the A3 have rerouted to use these routes to access the A3 instead of the A287 and the crossroads.
- At OYA the A287 south of the former crossroads (site 6) showed no change, however at FYA there has been a 15% increase in traffic south of the A3 indicating traffic is now travelling on the A287 rather than local roads between the A287 and the A3 at Hazel Grove Junction (site 22).

### Traffic flows on A3 by hour

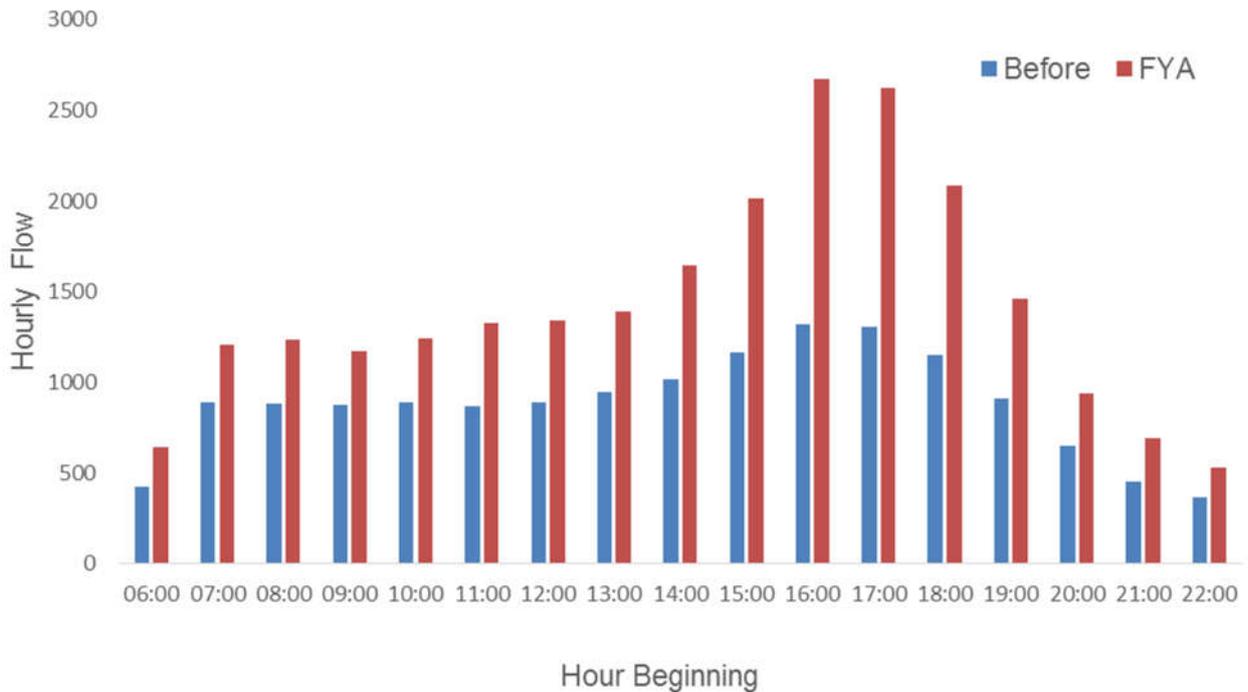
2.28. At the OYA opening stage, it was identified that there was additional traffic (27% - 8,400 vpd) on the A3 following the opening of the scheme, resulting in average weekday flows being 39,900. At FYA, traffic flows have further increased, with average weekday traffic flows now 50,100 (59% increase from OYA) as such it is important to consider whether traffic flows have

changed diurnally. Figure 2.7 and Figure 2.8 show the hourly traffic volumes on the A3 (site B) before and FYA the scheme opened.

**Figure 2.7 - A3 northbound (Site B) average weekday traffic flow by hour**



**Figure 2.8 - A3 southbound (Site B) average weekday traffic flow by hour**



2.29. The key points shown by the hourly traffic flow graphs for the A3 are:

- Traffic flows are tidal, with more traffic travelling northbound in the AM peak and more southbound in the PM peak.

- Traffic flow growth at FYA opening has been strongly focused on the peak flow periods namely in the AM peak in the northbound direction and PM peak in the southbound direction.
- Before the scheme opened, traffic flows were relatively consistent throughout the day meaning that people were travelling over the course of the day to avoid busy periods. However, as traffic can now travel using the new route and avoid the crossroads, peak hour traffic has grown, hence the changes in the peaks. Southbound traffic in the PM peak is particularly high between 16:00-18:00, and traffic has grown between 16:00-17:00 southbound compared to OYA.

2.30. HGV flows were not comparable at FYA due to inconsistent classification with pre-scheme and post scheme data, and as a result, analysis has not been conducted.

### **Forecast vs. observed traffic**

2.31. Before undertaking an evaluation of the forecast traffic impacts compared to those which have occurred, it is first necessary to develop an understanding of how the scheme has been appraised and the key assumptions used.

#### **Traffic modelling approach**

2.32. The A3 Hindhead traffic model was calibrated and validated for a base year of 2002, based on an earlier model from 2000 which was prepared for the study of a tolling option.

2.33. The scheme which was built was justified based on an appraisal of impacts carried out in 2005 which were an updated version of extensive appraisal in the Forecasting Report of October 2003. Updates covered amendments to the scheme resulting from the consultation process which were adopted during the public inquiry and revisions to the Highways England's (at the time, the Highways Agency) advice and guidance on forecasting procedures in the interim period.

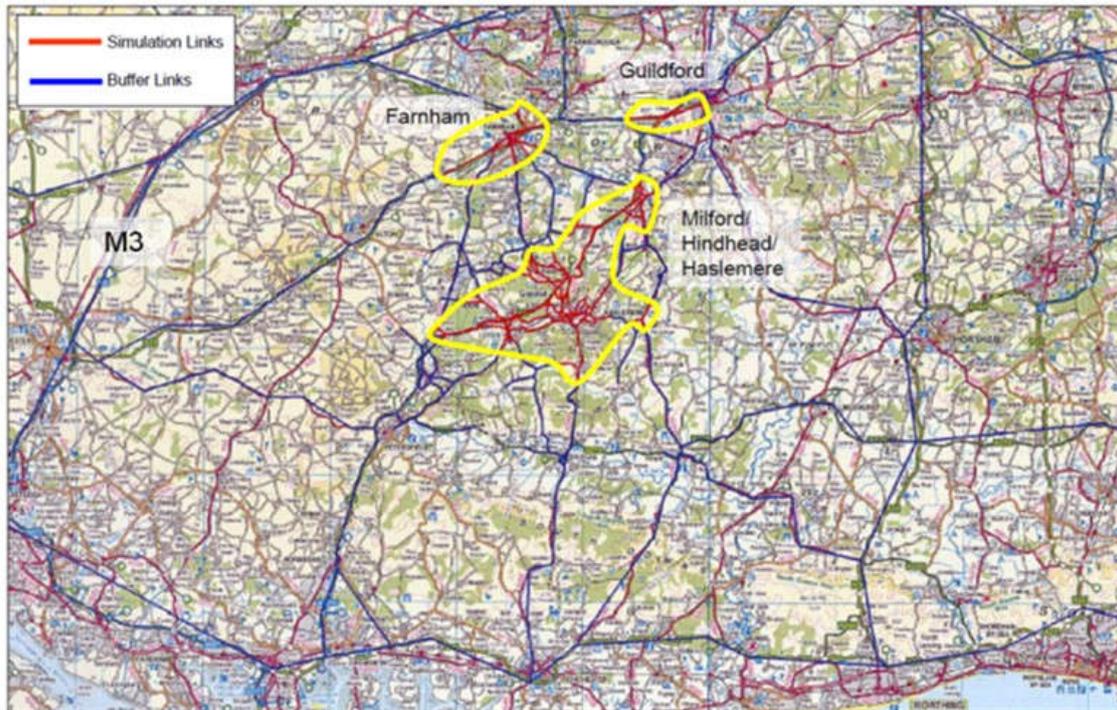
2.34. The updated forecast from 2005 used central growth factors for light vehicles, extracted from the policy-based TEMPro (version 4.2) data for the period 2009–2012 and 2024–2027. These factors were then adjusted for fuel and income multipliers, and applied to the 2009 and 2024 central growth matrices. NRTF97 growth factors were used for HGVs.

2.35. Forecast assignments were produced for an assumed opening year of 2012 as well as for a 2027 design year.

#### **Geographical coverage**

2.36. The SATURN model was focused on Hindhead and Haslemere (south east of Hindhead). All main roads and significant rat runs in this area were included, and junctions were coded in detail for simulation, so that queues and delays could be properly represented. Micro-simulation modelling using VISSIM was undertaken for these junctions. Other simulation areas were also included to represent traffic conditions on the Farnham Bypass, at Milford, and at the A3/A31 intersection in Guildford. These areas are shown in Figure 2.9.

Figure 2.9 - Modelled area



- 2.37. An 'elastic assignment' procedure was used for all tests to allow for:
- Trip suppression, where the increased costs of congestion would discourage more marginal road users from travelling in the peak hour, and therefore reduce traffic growth; and
  - Induced traffic effects of the scheme, where travel cost reductions would generate additional vehicle trips, and therefore increase traffic growth. The levels predicted were in the range up to 5%.

### Forecast considerations

- 2.38. Local planning data for Hampshire and Surrey was checked and no major developments were expected. Network changes within the modelled period included:
- Grade separation of the A3 Thursley interchange (completed).
  - Part signalisation of the A31/A287 Shepherd and Flock Roundabout at Farnham (completed).
  - Signalisation of the Tilford Road/Menin Way crossroads, represented by a small additional delay on Tilford Road, (completed).
  - Closure of one bridge across the Whit Mead at Tilford and signalisation of the other (represented by a small additional delay on Tilford Road) (not completed).
  - Provision of a pelican crossing in Woolmer Hill Road (completed).
- 2.39. The Forecasting Report concluded that the scheme would significantly improve operating conditions in the A3 corridor in all time periods. It would eliminate current queues and delays at the A3 Hindhead crossroads, and thus reduce journey times for A3 traffic. By concentrating through traffic on the A3, it would also serve to relieve other local routes of rat running traffic.
- 2.40. The latest traffic forecasts published prior to the start of construction are in the Addendum to the Forecasting Report (2005). That report took into account changes to the start of construction, announced by the Secretary of State in December 2004, amendments to the scheme resulting from the consultation process and adopted during the public inquiry, and recent revisions to Highways England (at the time named the Highways Agency)'s advice and guidance on forecasting procedures.

2.41. The revised opening year was 2012. The actual opening was in July 2011, but this FYA study is based on 2016 data, and therefore a comparison with the published forecasts for 2012, interpolated to 2016 levels is presented, with observed data for the same year. Central growth only was presented in the forecasts.

### Accuracy of Do Minimum Flows

2.42. Table 2.5 compares the observed traffic flows before the start of scheme construction against forecasts for the Do Minimum scenario (without scheme). The published forecasts were for 2012, so to make a comparison on an equal basis, proxy forecasts for 2007 have been created. These were based on the trend between the predicted flows for the two future years. The forecasts were for Annual Average Daily Traffic (AADT) and these have been compared to Average Daily Observed Traffic (ADT), hence the observed numbers are different to those presented earlier in the traffic section.

2.43. The difference between forecast and observed flows is highlighted in green if differences are  $\pm 10\%$  and differences in excess of this range are shown in orange.

**Table 2.5 - Forecasts vs. observed data: without scheme (AADT, DM, ADT, and Observed)**

Map Ref.	Site Description	AADT 2007: No Scheme			% Change
		Forecast DM	Observed Before	Difference	
B	Old A3 across Common	29,100	31,000	1,900	7%
	New A3 in tunnel	-	-	-	-
D	A3 between Tower Rd and B3002 Headley Rd	31,100	30,100	-1,000	-3%
E	A3 between B3002 Headley Rd and Crossways Rd	26,100	24,200	-2,000	-8%
21, 29, C, & D	Hindhead Crossroads - total throughput	39,700	36,100	-3,600	-9%
4	A325 Wrecclesham Hill	20,000	17,200	-2,800	-14%
6	A287 Hindhead Rd, S of A3	11,900	11,700	-200	-2%
7	A286 Grayswood Rd	11,700	10,000	-1,700	-15%
10	A287 Churt Rd, Churt	7,900	6,700	-1,200	-15%
11	Whitmore Vale Rd, W of School Rd	600	1,100	500	85%
12	B3002 Headley Rd, E of Crossways Rd	6,400	7,700	1,300	20%
13	Headley Rd, W of Crossways Rd	8,400	7,900	-500	-6%
14	Crossways Rd, SE of Headley Rd	4,400	3,800	-600	-13%
15	Crossways Rd, NW of A3	5,100	3,100	-2,000	-39%
19	B3002 Headley Rd, W of A3	6,500	6,400	-100	-2%
22	Hazel Grove, S of A3	1,400	1,000	-300	-25%
23	High Pitfold, W of Hazel Grove	1,700	600	-1,000	-63%
24	Hammer La, S of A3	3,000	2,900	-100	-5%
25	Woolmer Hill Rd, E of Sandy La	3,000	3,300	300	9%
26	Knockhundred La, S of A3	700	900	200	29%
27	Sandy La, S of Woolmer Hill Rd	1,100	800	-300	-29%
28	B2131 Liphook Rd, Hammer	9,600	8,000	-1,600	-17%

2.44. The results in Table 2.5 show:

- Traffic flows on many routes are below those forecast.
- Traffic on the A3 and total throughput at the crossroads was within 10% of the forecast.

2.45. The underestimation of the traffic before construction had started is due to the underlying growth assumptions being based on NRTF97, which, for the 2000s decade, was too high compared with the more recent National Transport Model (NTM) forecasts.

### Accuracy of Do Something flows

2.46. In Table 2.6, the Do Something (with scheme) forecast traffic flows for 2016 estimated using straight line interpolation between 2012 and 2027 are compared with those flows observed on the A3 corridor and within the wider area.

**Table 2.6 - Traffic flow forecasts vs. observed data: with scheme (AADT, DS)**

Map Ref.	Site Description	AADT 2016: With scheme			% Difference
		Forecast DS (2016)	Observed FYA (2016)	Difference	
B	Old A3 across Common	-	-	-	-
	New A3 in tunnel	37,600	48,400	10,800	29%
D	Former A3 between Tower Rd and B3002 Headley Rd	15,200	15,300	100	1%
E	Former A3 between jct with new A3 and B3002 Headley Rd	13,700	14,300	600	4%
21,29,C,D	Former Hindhead Crossroads Total Throughput	20,100	18,400	-1,700	-8%
4	A325 Wrecclesham Hill	20,400	14,600	-5,800	-28%
6	A287 Hindhead Rd, S of A3	14,700	12,900	-1,800	-12%
7	A286 Grayswood Rd	11,800	7,300	-4,500	-38%
10	A287 Churt Rd, Churt	10,300	5,700	-4,600	-45%
12	B3002 Headley Rd, E of Crossways Rd	6,100	7,200	1,100	18%
14	Crossways Rd, SE of Headley Rd	4,500	3,500	-1,000	-22%
15	Crossways Rd, NW of A3	6,400	3,800	-2,600	-41%
19	B3002 Headley Rd, W of A3	7,400	7,700	300	4%
22	Hazel Grove, S of A3	1,800	1,000	-800	-44%
23	High Pitfold, W of Hazel Grove	900	300	-600	-67%
24	Hammer La, S of A3	5,100	4,500	-600	-12%
26	Knockhundred La, S of A3	1,100	1,300	200	18%
28	B2131 Liphook Rd, Hammer	10,400	8,000	-2,400	-23%

2.47. The key points shown by this comparison between the forecast and observed traffic with scheme are:

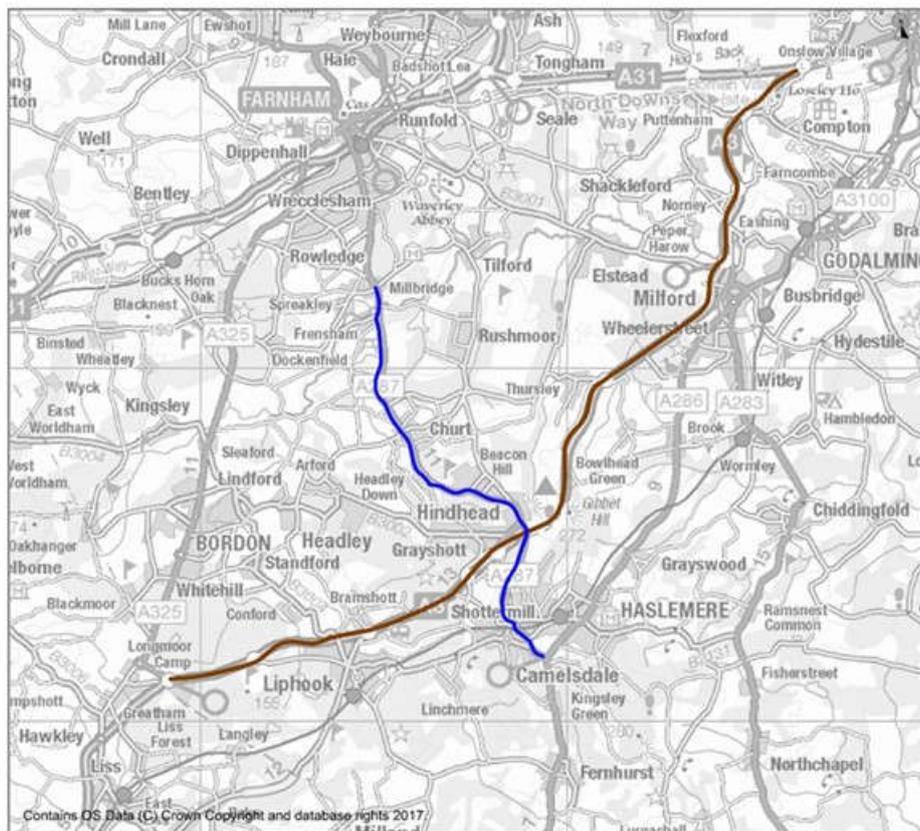
- Many roads have observed traffic volumes which are below the forecasts, something also seen at OYA.
- Traffic via the tunnel is 29% (site B) above the forecast. Compared to other local A roads (sites 4, 6, 7 and 10) where traffic is below that forecast. Traffic has re-routed on to the A3 from other A roads, but also it is likely that traffic has continued to grow from the wider strategic area including the A31 and M3.
- This suggests that the modelling underestimated wider area re-routing. It is likely that this is related to how the model predicted the attractiveness of the route would impact flows, rather than due to the model size
- At the location of the former crossroads, traffic is 8% below forecast.
- The traffic modelling is likely to have expected continual traffic growth, however, as shown there was a dip in traffic during the recession and this is likely to have had an impact on growth levels.

## Journey Times

2.48. This section examines the change in journey times following the scheme opening. One of the scheme's objectives was to improve journey times and reliability on the A3. Secondary to this is the impact at the former crossroads, the A287.

2.49. As the scheme's appraisal indicated that it was expected to have an impact on traffic route choice on a number of other roads in the local and wider area, journey times were also assessed on four additional routes at the OYA stage. However, journey time changes were fairly low and were likely not to be a result of the scheme itself. Therefore, at the FYA stage it has been deemed appropriate to only analyse the A3 and the A287 both mentioned in the scheme objective (shown in Figure 2.10).

**Figure 2.10 - Journey time analysis routes**



2.50. The following surveys on these routes were undertaken:

- **Before construction (March 2007):** Surveys were undertaken using the moving observer method.
- **One Year After opening (November 2012 - October 2013):** Journey time data sourced from satellite navigation devices.
- **Five Year After opening (November 2015 - October 2016):** Journey time data sourced from satellite navigation devices.

2.51. The time periods considered within the analysis were based on the forecast journey time periods, which were checked against the observed traffic flow profile. The time periods surveyed were as follows:

- **AM peak weekdays** (07:00 to 09:00)
- **Interpeak weekdays** (10:00 to 15:00)
- **PM peak weekdays** (16:00 to 18:00)
- **Sunday afternoons** (15:00 to 19:00)

### Journey times on routes directly impacted by the Hindhead Improvement scheme

2.52. Comparisons between the before and after journey times on the routes which used the Hindhead Crossroads before this scheme was built are shown in Table 2.7 and Table 2.8.

**Table 2.7 - Journey Times: A3 route between A31 and A325**

			Before (2007)	OYA	Saving	% Change	FYA	Saving	% Change
A3 Route	NB	AM	45:02	18:00	27:02	-60%	20:41	24:21	-54%
		IP	23:03	15:58	07:05	-31%	16:12	06:51	-30%
		PM	22:23	15:31	06:52	-31%	15:42	06:41	-30%
		Sun PM	28:45	16:06	12:39	-44%	16:42	12:03	-42%
	SB	AM	19:42	15:56	03:46	-19%	15:55	03:47	-19%
		IP	15:55	16:12	-00:17	2%	16:13	-00:18	2%
		PM	16:12	15:55	00:17	-2%	16:15	-00:03	<0%
		Sun PM	19:27	15:29	03:58	-20%	15:14	04:13	-22%

**Table 2.8 - Journey Times: A287 Route**

			Before (2007)	OYA	Saving	% Change	FYA	Saving	% Change
A287 Route	NB	AM	22:59	16:30	06:29	-28%	16:47	06:12	7%
		IP	16:22	16:52	-00:30	3%	16:38	-00:16	2%
		PM	18:22	17:04	01:18	-7%	16:49	01:33	-8%
		Sun PM	14:56	16:09	01:13	-8%	15:37	-00:41	5%
	SB	AM	18:34	17:01	01:33	-8%	17:34	01:00	-5%
		IP	17:08	16:41	00:27	-3%	16:29	00:39	-4%
		PM	18:17	16:38	01:39	-9%	16:47	01:30	-8%
		Sun PM	15:40	15:35	00:05	-1%	15:34	00:06	-1%

- 2.53. Table 2.7 shows the journey time savings on the A3. The key points at the FYA stage are:
- The savings seen at OYA have largely been maintained.
  - Large savings are observed on the A3 northbound for all time periods surveyed.
  - The largest saving for northbound traffic is in the AM peak period, where a 24-minute time saving has been observed. This is three minutes lower than the OYA observation, however this still represents around a 54% saving over the distance of 30km and reflects the severity of the congestion experienced by the AM London-bound traffic before the scheme was opened.
  - This 3-minute difference in journey time in A3 northbound AM peak is likely to be attributed to the increase in traffic on the A3 highlighted earlier in the chapter, as more traffic is using the route it would be expected that journey times will increase slightly.
  - Sunday afternoon traffic shows a similar level of saving to the interpeak periods on weekdays. However, it should be noted that the before period survey was undertaken in March; the summer months would have experienced greater congestion and hence greater time savings.
  - In 2016, the observed times show little variation across the time periods in either direction, which strongly indicates reliability of journey times across the week.
- 2.54. Table 2.8 shows the journey time savings on the A287. The key points at five years after are:
- At FYA there are savings of around 6 minutes for northbound traffic in the AM peak and around 1 minute southbound.
  - Traffic travelling southbound is benefitting from time savings of one minute or more in the AM and PM peak, and northbound traffic is still benefitting in the PM peak.
  - There are no substantial savings seen in the inter-peak or Sunday afternoons northbound.

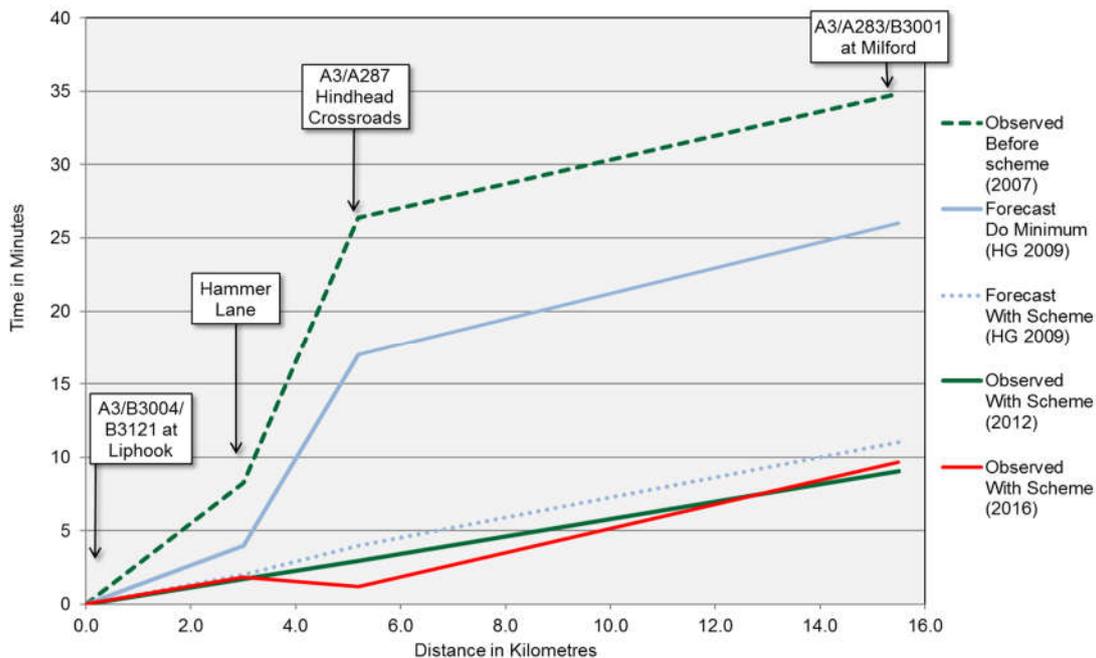
### **Forecast vs. outturn journey times**

- 2.55. The Traffic Forecasting Report (2003) set out the modelled journey times on the A3 between Liphook and Milford for the then predicted opening year of 2009, and for the design year of 2024.
- 2.56. The 2003 report was superseded by the Addendum Report (2005), which did not include details of the forecast journey time impacts, however, it did give traffic forecasts based on central, “most likely” growth factors. These replace the previous high and low growth forecasts presented in the 2003 report. The central growth factors for 2002-2012 contained within the 2005 report were similar to the previous high growth factors for 2002-2009 covered in the 2003 report. It has therefore been assumed that the 2009 high growth forecast (from 2003 report) is equivalent to a 2012 central growth forecast (from 2005 report) and thus it is appropriate to use the high growth journey time forecast.
- 2.57. The original forecasts were presented in graph form for a 16km section of the A3 for the improvement scheme between Liphook and Milford. The graphs overleaf show the forecasts (opening year 2009 high growth scenario now equivalent to 2012 central growth) against observed data between the same points on the journey time route.
- 2.58. Forecasts were not presented for both directions in the AM peak, IP and PM peak periods. Journey time forecasts were presented for the eastbound direction in the AM peak and IP period, and the westbound direction in the PM peak period. The graphs overleaf therefore compare observed data with the forecasts available. It should be noted that the observed route used for comparison with forecasts is not the entire route presented in Table 2.7. The total journey observed journey times for the section of the A3 between Liphook and Milford routes included in the graphs are summarised in Table 2.9.

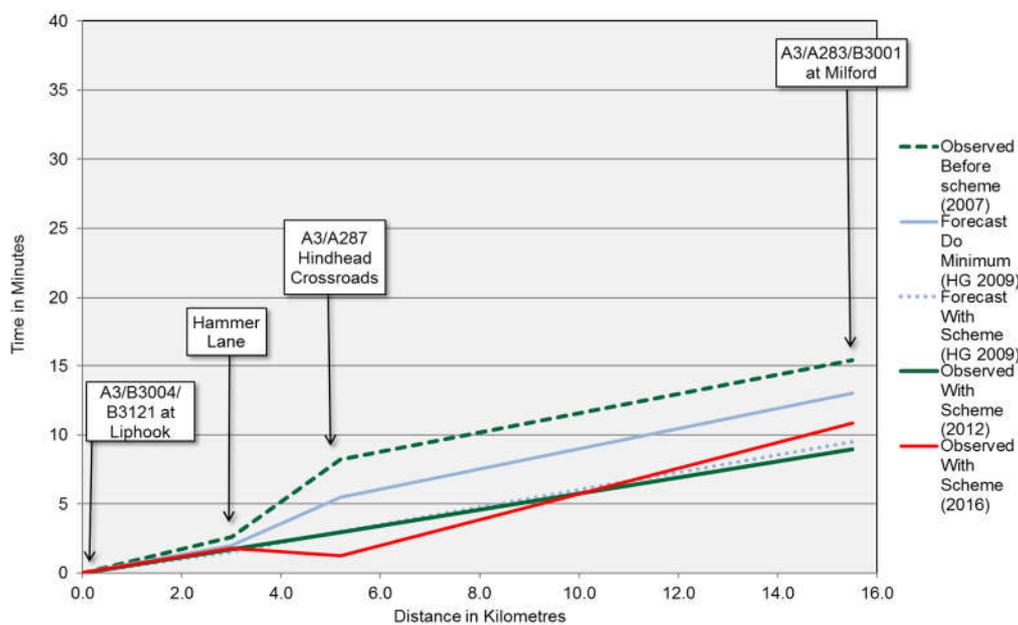
**Table 2.9 - Journey time savings between Milford and Liphook**

Time Period - Direction	Before	OYA	FYA
AM - Northbound	34:52	09:03	09:39
IP - Northbound	15:23	08:56	10:51
PM - Westbound	15:51	08:53	08:28

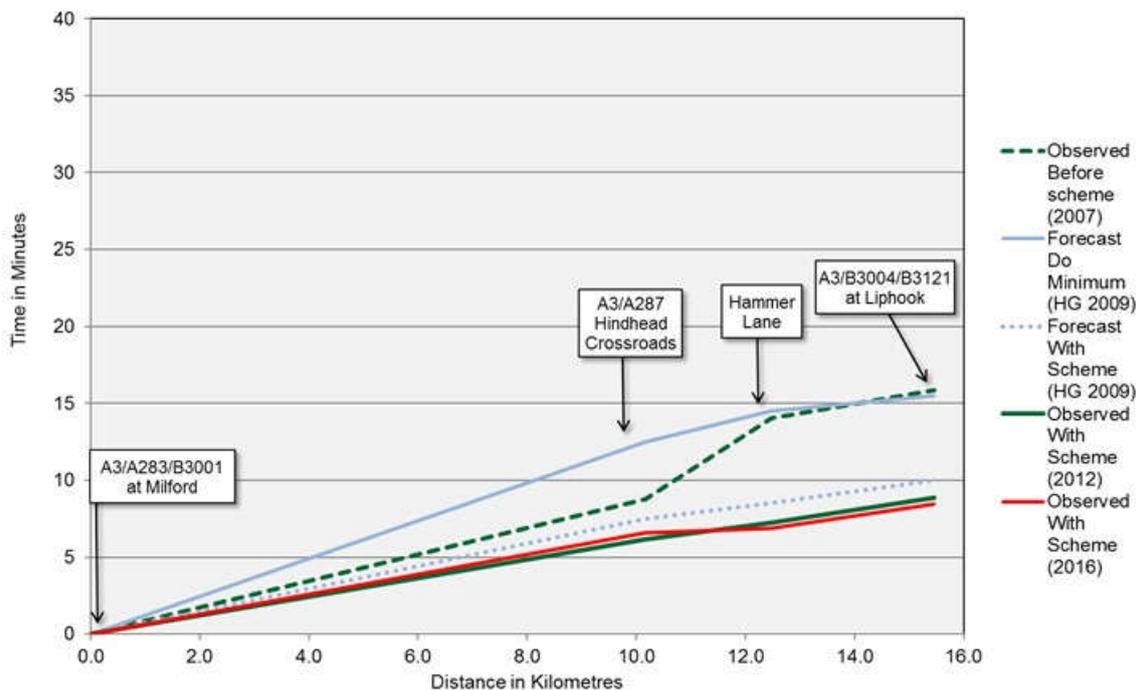
**Figure 2.11 - A3 journey times: forecast vs. observed AM peak - northbound**



**Figure 2.12 - A3 journey times: forecast vs. observed IP – northbound**



**Figure 2.13 - A3 journey times: forecast vs. observed PM – southbound**



2.59. The key findings from these comparisons of forecasts against observed data are:

- Journey times were expected to be highest in the AM peak before and after. The greatest delays were forecast to be in the AM peak periods northbound on the approach to Hindhead Crossroads; but the observed data shows that after the scheme has opened (at OYA and FYA) there are no delays at this location.
- Five years after scheme opening, the AM journey time on this route is similar to OYA. The journey times at FYA are lower than the forecast journey time at particular locations.
- In the interpeak period at OYA, the observed journey time was slightly lower than forecast, however at five years after, the observed journey time is higher than forecast at around 11 minutes compared to a forecast of around 9 minutes. It is just after the A3 Hindhead Crossroad where journey times start to deviate from the forecast.
- Observed journey times for PM westbound traffic are lower than forecast.

### Journey time reliability

2.60. The only forecast for the reliability impact of this scheme is within the AST and the assessment is presented as the ratio between the AADT and the Congestion Reference Flow (CRF). This is also known as the route stress metric and is defined in DMRB<sup>9</sup>. This gives quantitative figures for route stress based on the ratio of traffic flow to road capacity. The net change in stress within the range 125% to 75% is then used to give a qualitative assessment.

2.61. The AST notes that this assessment of reliability does not measure A3 congestion at the junction. Traffic on the A287 which formerly intersected with the A3 at the crossroads was expected to have a slight reduction in reliability due to reduction in throughput at the new double mini-roundabout.

2.62. The predictions and observed results for the A3 are shown in Table 2.10.

<sup>9</sup> Design Manual for Roads and Bridges Volume 5 section 1 part 3

**Table 2.10 - Route Stress on A3**

Forecast (AST)		Observed	
Do Minimum (2006)	116%	Before (2007) North of Hindhead	125%
Do Something (2006)	53%	FYA (2016) North of tunnel	67% (adjusted to 75%)

2.63. The assessment in Table 2.10 shows that:

- The scheme has reduced route stress on the A3 indicating improved reliability.
- The reduction in route stress between the before and after scheme opening periods is similar to forecast (e.g. 63 percentage point reduction compared to 58 percentage point reduction).

2.64. The AST forecast that the A287 would suffer a slight reduction in reliability due to reduced throughput at the crossroads. This cannot be evaluated using observed data.

2.65. It should be noted that it has not been possible to compare the pre-scheme and post-scheme Planning Time Index (PTI) because the before and after data is from different sources with different sample sizes. The PTI is a relatively new metric by which reliability is measured, designed to indicate how much additional time road users need to allow to ensure that they arrive on time.

## Key points from Traffic Evaluation

### Traffic Flows

- Following the scheme opening, average weekday traffic flows have increased on the A3, with an increase of 59% north of the tunnel where weekday flows are just over 50,000 vehicles per day. South of the scheme shows a similar pattern with an increase of 68%, which is the equivalent of around 17,000 additional vehicles per day.
- There is a reduction in traffic on minor roads in the vicinity of the tunnel which no longer have direct access the A3. Flows on the old A3 have approximately halved (reduced by between 9,000 and 14,000 vehicles) since the scheme opened.
- There has been an increase in traffic on the B3002 where traffic formerly using Crossways Road for access to the A333 has now re-routed.
- At OYA there was traffic growth on Crossways Road (site 15) compared to pre scheme however traffic calming measures have been installed since OYA and there has been a decrease in traffic on this road (although still an increase compared to pre scheme).
- At OYA analysis of wider traffic patterns in the area showed that traffic had re-routed onto the A3. At FYA flows on the A31 have returned to pre scheme levels having decreased slightly at OYA.
- Flows on the A287 have increased post opening, reflecting the rerouting to reach the A3. However, the A286 (an alternative to the A3 alignment) has decreased by 29% at FYA suggesting traffic has moved to a more suitable route.

### Traffic Forecasts

- Traffic via the tunnel is 29% above that forecast. As this is against the trend shown for almost all other road in the local area it is likely that five years after scheme opening more strategic traffic is using the road.
- Before the start of construction, actual traffic volumes were lower than forecast on many roads and, as this was prior to the start of the economic downturn, traffic growth was overestimated.
- A number of local traffic volume changes are now below forecast, although the B3002 is 18% above forecast at FYA whilst traffic on Crossways Road has fallen below forecast FYA after traffic calming implementation.

### Journey Times

- At FYA large savings have continued to be observed in all time periods and both directions.
- Greatest savings continue to be made in the AM peak London-bound at 24 minutes (-50%). The return southbound traffic in the PM peak has savings of six-and-half minutes.
- The other A road which used the crossroads is the A287; journeys on that road were affected by congestion on the A3 in the peak periods before the scheme opened. Now there is no junction with the A3, peak period journey times on this road have improved by over a minute in the peak periods, rising to over six minutes for AM NB traffic.
- The A road route which provides an alternative to the A3 between Guildford and Petersfield (A325 and A31, a mixed single and dual carriageway route) shows improved journey times since the Hindhead scheme opened. This will be due to reduced congestion due to some traffic rerouting to use the improved all dual carriageway A3 instead.

## 3. Safety

### Introduction

- 3.1. This section of the report examines how successful the scheme has been in addressing the objective of improving safety. The focus of this objective is to reduce the loss of life, injuries and damage to property resulting from transport collisions and crime. This has been assessed by analysing the changes in Personal Injury Collisions (PICs) occurring five years before the start of construction and five years after opening.
- 3.2. The Economic Assessment Report (EAR) stated that:
- “the A3 Hindhead Scheme would offer significant benefits to both consumers and business users over large parts of the working day and at weekends. The scheme would reduce congestion and improve journey times by relieving the existing single-carriageway section of the A3, and attracting traffic from less suitable local roads. It would also improve safety in the A3 corridor, which has a very poor accident record.”*
- 3.3. This section of the report assesses how far the scheme has achieved this objective based on observed data.

### Data Sources

#### Forecasts

- 3.4. The forecast impact of the scheme on safety has been taken from the scheme COBA (Cost Benefit Analysis)<sup>10</sup> model and the AST. The forecast impact on safety is expressed in terms of numbers of personal injury collisions saved with the associated numbers of casualties and the economic benefit of the saving. This section of the evaluation focusses on collision numbers and the economic impact of changes in collisions is assessed later in Section 4 of this report.
- 3.5. The EAR described the study area used in the modelling of collision impacts as the area bounded by a set of roads and is illustrated in Figure 3.1. It is noted that this area is not as wide as the area used for traffic modelling (as shown in Figure 2.9), as for instance it does not extend as far as the M3. The geographical coverage of the area shown in Figure 3.1 is considered to align to the study area described in the EAR.

#### Observed data

- 3.6. Collision data for the study area has been obtained from Surrey and Hampshire County Councils.
- 3.7. The original appraisal was based on observed data for the period 1998 to 2002 inclusive. This FYA report compares the five years prior to the start of construction, with the maximum of post opening data at this time (59 months). The date periods examined are as follows:
- Pre-Construction (April 2002- March 2007)
  - During Construction (April 2007- July 2011)
  - Post Opening (August 2011- June 2016)
- 3.8. The collision data used in this report is based on the records of PICs (i.e. collisions that may involve injuries to one or more persons) recorded in the STATS19 data collected by the police when attending collisions. Collisions that do not result in injury are not included in this dataset and are therefore not considered in this evaluation.
- 3.9. It should be noted that at this stage, not all the collision data has yet been validated by the DfT. The requirement for up to date and site specific information necessitated the use of

---

<sup>10</sup> COBA is Cost Benefit Analysis software, used in the case of this scheme solely for the safety impact.

unvalidated data sourced from the local authority. The data is judged to be sufficiently robust for use in this study, but it may be subject to change. However, it is not anticipated that this would be significant in terms of the analysis of collision numbers presented in this report.

### Background changes in collision reduction

- 3.10. It is widely recognised that for over a decade, excluding the most recent year when collision numbers and rates increased, there has been a year-on-year reduction in the number of PICs on roads, even against the trend of increasing traffic volumes during much of the same period. The reasons for the reduction are considered to be wide ranging and include improved safety measures in vehicles and reduced number of younger drivers. This background trend needs to be considered when examining the changes in collision numbers. If the scheme had not yet been built, collision numbers in the area are still likely to have been influenced by wider trends and therefore reduced.
- 3.11. When the number of collisions in this area in the years before (pre-scheme) and after (post-scheme) the scheme was built are compared, the change in the number of collisions, once the change in the area is considered, can be primarily linked to the scheme. The best way to do this is to assume that, if the scheme had not been built, the number of collisions on the roads in the study area would have dropped at the same rate as they did nationally during the same time period. This gives what is known as a “counterfactual” scenario. The counterfactual scenario (without scheme) scenario can be compared on a like for like basis with post-opening (with scheme) scenario.
- 3.12. The difference between the numbers of collisions in these two scenarios can then be attributed to the scheme rather than the wider national trends. This result will inform the calculation of monetised safety benefits achieved by the scheme as discussed in the economy chapter of this report.
- 3.13. The counterfactual scenario compares the national collision data<sup>11</sup> in the pre-scheme period (annual average) to the post-scheme period (annual average) for collision numbers and collision rates. The most recent statistics available only extend to 2015. Table 3.1 illustrates that there has been a 27% reduction in collision numbers on all roads in Great Britain between the pre-scheme and post-scheme periods. This reduction has been applied to the pre-scheme opening collision numbers to create the counterfactual scenario. The equivalent counterfactual for casualties has also been calculated, which shows that there has been a 29% reduction during the same period. These reductions in national collision numbers presented here have been used in calculations of the collision savings in this section.

**Table 3.1 - Calculation of the counterfactual used in this evaluation**

Year	Evaluation Period	Total number of collisions <sup>12</sup>	Average	Total number of casualties <sup>13</sup>	Average
2003	<b>Before scheme opening</b>	214,030	198,290	290,607	269,730
2004		207,410		280,840	
2005		198,735		271,017	
2006		189,161		258,404	
2007		182,115		247,780	
2011	<b>After scheme opening</b>	151,474	144,417	203,950	192,082
2012		145,571		195,723	
2013		138,660		183,670	
2014		146,322		194,477	
2015		140,056		186,189	
		Change (%)	-27%	-	-29%

<sup>11</sup> National trend data is sourced from DfT Table RAS10002

<sup>12</sup> Great Britain, all roads

<sup>13</sup> Great Britain, all roads, all speeds

## Changes in Collision Numbers

- 3.14. This section analyses observed changes in the number of PICs following the implementation of the scheme. This includes investigating the changes in the number of collisions and severity of collisions as well as the changes in the number of associated casualties.
- 3.15. The collision analysis focusses on two geographical areas, a wider area (scheme study area) and a narrower area (A3 & A3 Hindhead) covering the former route of the A3 and the new A3 route. The geographical extent of the analysis areas is shown in Figure 3.1.

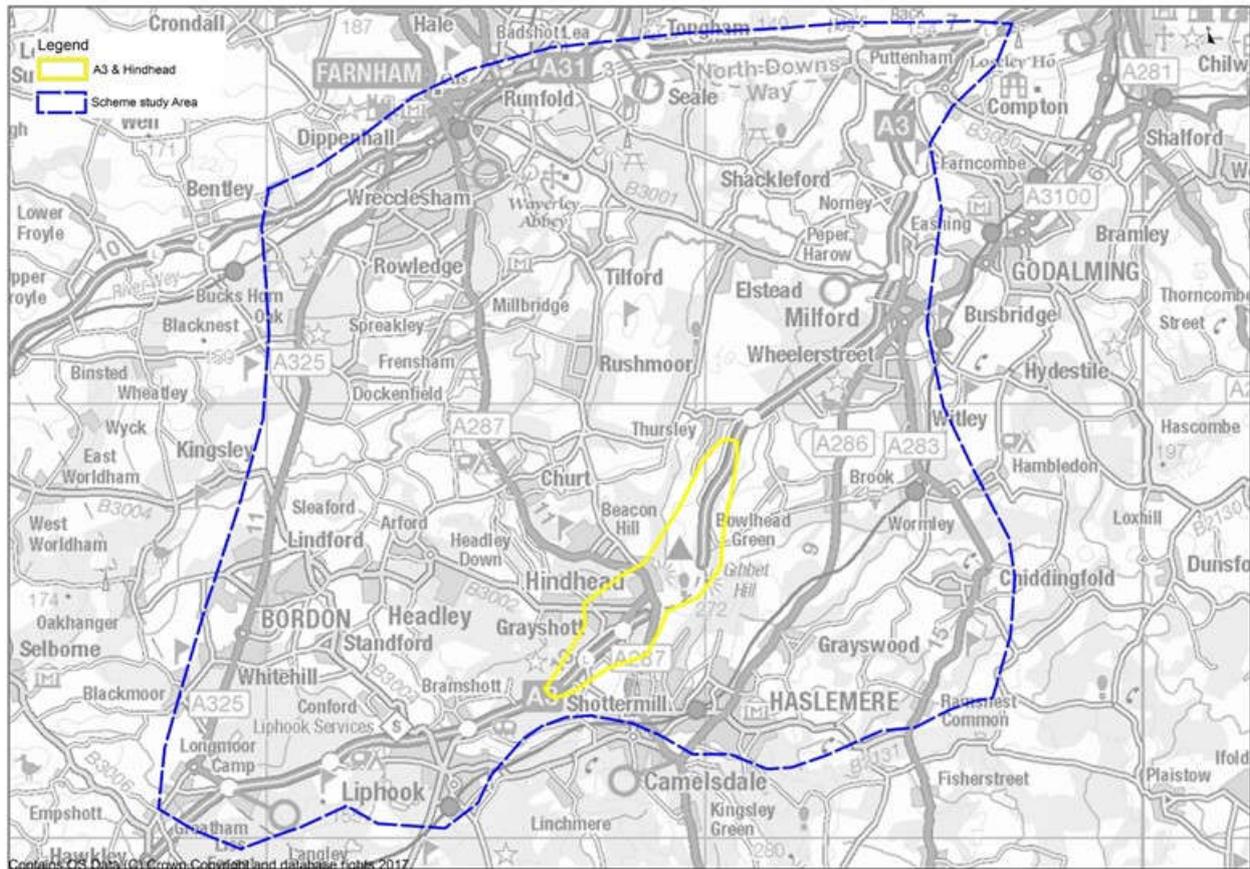


Figure 3.1 - Scheme study area (COBA, wider area) and A3 & Hindhead area (narrower area)

### COBA Modelled Area Collision Analysis

- 3.16. Firstly, the impact of the scheme on collision numbers for the COBA modelled area (wider area) is considered. Table 3.2 presents the change in collision numbers five years before the start of construction, during construction and 59 months after opening. The results in Table 3.2 include the application of the counterfactual and thus the saving presented takes account of any background changes in collision numbers.

**Table 3.2 - Collision analysis for COBA area**

Time Period	Date		Number of Collisions				Annual Average				Severity Index
	From	To	Fatal	Serious	Slight	Total	Fatal	Serious	Slight	All	
Before Scheme Opening	Apr-02	Mar-03	10	56	397	463	6.0	48.8	378.2	433.0	13%
	Apr-03	Mar-04	8	47	376	431					
	Apr-04	Mar-05	5	55	354	414					
	Apr-05	Mar-06	3	47	396	446					
	Apr-06	Mar-07	4	39	368	411					
<b>Application of counterfactual 0.73 (27% reduction)</b>										<b>315.4</b>	<b>-</b>
Construction Period	Apr-07	Mar-08	8	52	320	380	4.4	51.9	285.9	342.2	16%
	Apr-08	Mar-09	6	45	289	340					
	Apr-09	Mar-10	3	49	276	328					
	Apr-10	Mar-11	2	52	269	323					
	Apr-11	Jul-11	0	27	85	112					
Five Years After Scheme Opening	Aug-11	Jul-12	3	50	270	323	4.5	55.1	250.1	309.7	19%
	Aug-12	Jul-13	4	45	256	305					
	Aug-13	Jul-14	3	75	237	315					
	Aug-14	Jul-15	8	55	234	297					
	Aug-15	Jun-16	4	46	232	282					
<b>Annual Collision Saving</b>										<b>5.6</b>	<b>-</b>

3.17. The results presented in Table 3.2 show:

- With the counterfactual applied, the pre-scheme annual number of collisions is 315.4 which when compared to after scheme annual collisions of 309.7, the total collision saving equates to 5.6 collisions per annum.
- The severity index has increased from 13% to 19%. Whilst there has been a decrease in the annual number of total collisions and the annual number of fatal collisions, there has been an increase in the number of serious collisions. This has resulted in the increased severity index.

### COBA Modelled Area Casualty Analysis

3.18. The number of casualties associated with the collisions reported in Table 3.4 is shown in Table 3.3. The annual average number of casualties is shown for the before and after scheme opening periods.

**Table 3.3 - Casualty analysis for COBA area**

Time Period	Date		Number of Casualties				Annual Average				Severity Index
	From	To	Fatal	Serious	Slight	Total	Fatal	Serious	Slight	All	
Before Scheme Opening	Apr-02	Mar-03	13	73	629	715	6.8	61.4	557.8	646.0	11%
	Apr-03	Mar-04	9	66	587	662					
	Apr-04	Mar-05	5	68	518	591					
	Apr-05	Mar-06	3	59	593	655					
	Apr-06	Mar-07	4	41	562	607					
<b>Application of counterfactual 0.71 (29% reduction)</b>										<b>461.8</b>	
Construction Period	Apr-07	Mar-08	8	64	522	594	4.4	59.5	446.8	510.7	13%
	Apr-08	Mar-09	6	55	457	518					
	Apr-09	Mar-10	3	55	431	489					
	Apr-10	Mar-10	2	57	394	453					
	Apr-11	Jul-11	0	27	132	159					
Five Years After Scheme Opening	Aug-11	Jul-12	3	55	397	455	4.9	59.6	361.6	426.1	15%
	Aug-12	Jul-13	6	47	378	431					
	Aug-13	Jul-14	3	78	339	420					
	Aug-14	Jul-15	8	62	334	404					
	Aug-15	Jun-16	4	51	329	384					
<b>Annual Casualty Saving</b>										<b>35.6</b>	

3.19. The results presented in Table 3.3 show:

- Without the counterfactual applied, the annual number of casualties in the pre-scheme period was 646 casualties. It is assumed that casualty numbers would have reduced by 29% due to background changes resulting in the annual number of casualties in the pre-scheme being 461.8 casualties.
- Comparison of the pre-scheme annual number of collisions with the counterfactual applied with the post-scheme number of collisions equates to a saving of 35.6 casualties per annum.
- Whilst the absolute number of fatal and serious casualties has reduced in the post-scheme period, the severity index has slightly increased from 11% to 15%.

### **Scheme section and A3 Hindhead collision analysis**

3.20. To examine the impact of the likely direct impact of the scheme on safety, collision and casualty analysis has been completed for a narrower area. This is constrained to the section of the A3 improved by the scheme including the former route, now de-trunked as the A333. The analysis covers the same date periods and the results are shown in Table 3.4. The counterfactual reduction applied is as per the analysis completed for the COBA area.

**Table 3.4 - Collision analysis for the scheme section and A3 Hindhead**

Time Period	Date		Number of Collisions				Annual Average				Severity Index
	From	To	Fatal	Serious	Slight	Total	Fatal	Serious	Slight	All	
Before Scheme Opening	Apr-02	Mar-03	2	7	32	41	1.0	6.8	39.4	47.4	17%
	Apr-03	Mar-04	1	8	36	45					
	Apr-04	Mar-05	1	4	40	45					
	Apr-05	Mar-06	0	12	41	53					
	Apr-06	Mar-07	1	3	48	52					
<b>Application of counterfactual 0.73 (27% reduction)</b>										<b>34.5</b>	<b>-</b>
Construction Period	Apr-07	Mar-08	0	4	25	29	0.5	2.8	21.9	25.2	13%
	Apr-08	Mar-09	1	1	28	30					
	Apr-09	Mar-10	1	4	20	25					
	Apr-10	Mar-11	0	2	13	17					
	Apr-11	Jul-11	0	1	9	10					
After Scheme Opening	Aug-11	Jul-12	1	0	13	14	0.4	3.3	13.4	17.1	21%
	Aug-12	Jul-13	1	4	12	17					
	Aug-13	Jul-14	0	4	13	17					
	Aug-14	Jul-15	0	3	13	16					
	Aug-15	Jun-16	0	5	15	20					
<b>Total Collision Saving</b>										<b>17.4</b>	<b>-</b>

3.21. Table 3.4 presents the following:

- With the application of the counterfactual, the pre-scheme annual number of collisions is 34.5 collisions. When compared to the after construction annual number of collisions, the total collision saving equates to 17.4 collisions per annum (a 50% reduction).
- The severity index has increased from 17% to 21% following the scheme opening, however it is noted that the absolute annual fatal and serious collision numbers has reduced. As the absolute number of fatal and serious collisions has not experienced the same percentage reduction as the total number of collisions, the result is an increase in the severity index<sup>14</sup>.

<sup>14</sup> Comparison of the counterfactual fatal, serious and slight annual pre-scheme collision numbers with the post-scheme collision numbers demonstrates that there has been a 42%, 33% and 53% reduction respectively. For fatal and serious collisions, this is less than the total percentage reduction of 51% resulting in an increase in the severity index.

## Scheme section and A3 Hindhead casualty analysis

3.22. Table 3.5 presents the casualty numbers for the same date periods.

**Table 3.5 - Casualty analysis for scheme section & A3 Hindhead**

Time Period	Date		Number of Casualties				Annual Average				Severity Index
	From	To	Fatal	Serious	Slight	Total	Fatal	Serious	Slight	All	
Before Scheme Opening	Apr-02	Mar-03	4	10	54	68	1.6	9.6	67.0	79.2	14%
	Apr-03	Mar-04	2	14	70	86					
	Apr-04	Mar-05	1	5	57	63					
	Apr-05	Mar-06	0	16	81	97					
	Apr-06	Mar-07	1	3	73	77					
<b>Application of counterfactual 0.72</b>										<b>56.6</b>	
Construction Period	Apr-07	Mar-08	0	5	45	50	0.5	3.7	39.0	43.2	10%
	Apr-08	Mar-09	1	3	50	54					
	Apr-09	Mar-10	1	5	34	40					
	Apr-10	Mar-11	0	2	23	25					
	Apr-11	Jul-11	0	1	17	18					
After Scheme Opening	Aug-11	Jul-12	1	0	20	21	0.8	3.3	20.1	24.2	17%
	Aug-12	Jul-13	3	4	21	28					
	Aug-13	Jul-14	0	4	17	21					
	Aug-14	Jul-15	0	3	19	22					
	Aug-15	Jun-16	0	5	22	27					
<b>Annual Casualty Saving</b>										<b>32.4</b>	

3.23. The key points to note regarding casualty numbers on the scheme and in the Hindhead area are:

- On average, with the counterfactual applied, there were 56.6 casualties per annum in the pre-scheme period. When compared with the post-scheme annual number of casualties of 24.2, there has been an annual saving of 32.4 casualties per annum.
- The severity index has slightly increased 14% to 17%. It can be seen that the annual average absolute number of fatal and serious casualties has reduced, but slight casualties have reduced to a greater extent, which results in the negligible increase in the severity index.

3.24. NMUs information was included within the datasets provided by Hampshire County Council and Surrey County Council, however due to the format of this information it was not considered to be robust enough to include within this evaluation. Instead, this evaluation draws upon the findings of the Road Safety Audit (RSA)<sup>15</sup> (36-month monitoring report) to understand the potential impact of the scheme on NMUs.

## Collision Locations

3.25. Interrogation of the location of collisions as shown in Figure 3.2 (before scheme opening) and Figure 3.3 (after scheme opening) indicates that there are no notable collision patterns. FYA scheme opening there has been one fatal accident in the scheme vicinity on the A3 mainline north of the tunnel and one on the scheme edge in Grayshott as shown in Figure 3.2.

3.26. The RSA noted that no collision clusters were identified on the A3 and there were no dominant patterns to the one cluster identified on the old A3 (A333), which can be seen in Figure 3.2. More information on the findings of the RSA are included later in this chapter.

<sup>15</sup> A3 Hindhead Improvement – Stage 4 (36 Month) Road Safety Audit, August 2016.

Figure 3.2 - Before scheme opening collision locations by severity

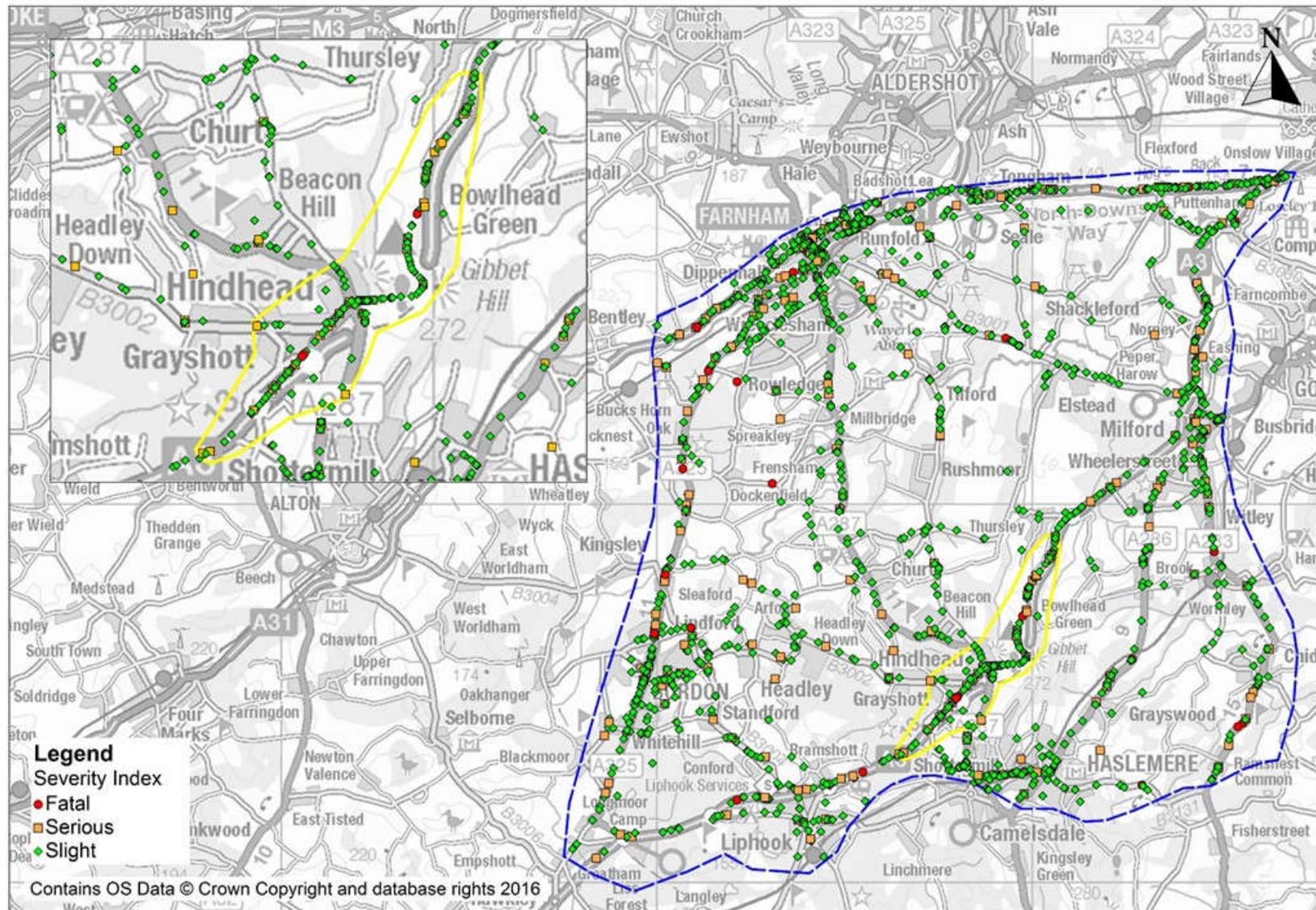
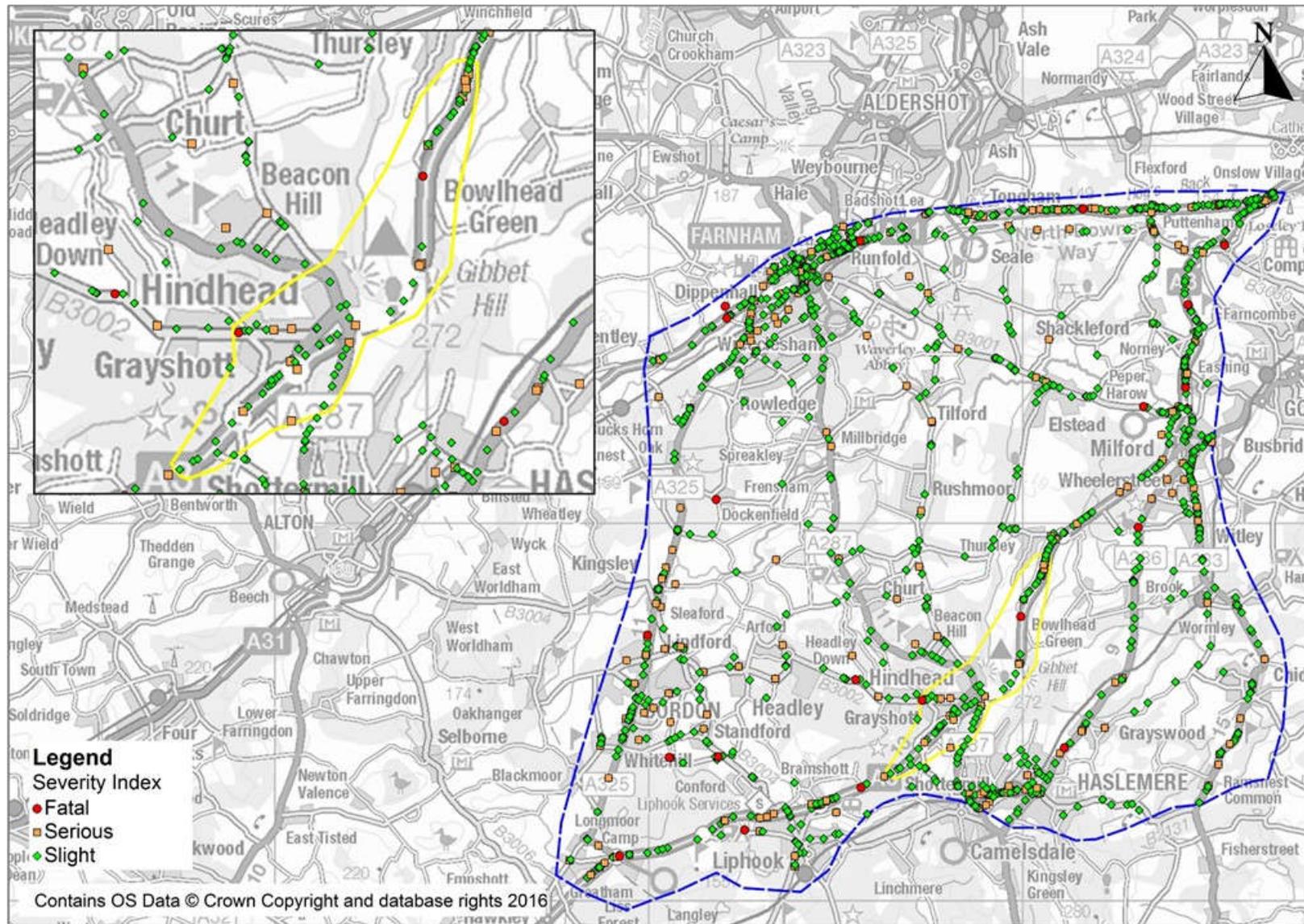


Figure 3.3 - After scheme opening collision locations by severity



### Forecast vs. observed change in collisions

3.27. The previous section considered the observed impact of the scheme on collisions numbers and this section now compares the observed impact with the forecast impact to establish whether the scheme has been successful at meeting its safety objectives.

3.28. The AST stated that there would be a substantial reduction in collisions. In this case annual forecast savings were given for the opening year (2012) and design year as follows (for the COBA area):

*Collisions reduced by 28 in 2012 rising to 35 in 2027.*

3.29. Table 3.6 presents the forecasts and observed collision numbers for the COBA modelled area and for the key links subset (scheme section and A3 as presented earlier in Figure 3.1). It should be noted that the forecast data for the Do Minimum is based on the same year as the Do Something, whereas the observed data for the before period is for before the scheme opened. As noted earlier, there has been a background reduction in collisions over the time period considered in this study. The observed results presented in Table 3.6 account for background changes in collisions.

**Table 3.6 - Forecast vs. observed collision savings**

Period / Scenario	Forecast (annual average)		Observed (annual average)		
	COBA Area	Key Links	Period	COBA Area	Key Links
Opening Year (2012) Do Minimum	620.3	40.1	Before scheme opening	433.0	47.2
			Counterfactual before scheme opening	315.4	34.5
Opening Year (2012) Do Something	592.1	18.9	After scheme opening	309.7	17.1
Saving (%)	28.2 (5%)	24.4 (61%)	Saving net	5.6 (2%)	17.4 (50%)

3.30. Table 3.6 shows that:

- The majority of the forecast collision savings were expected on the directly improved links rather than the wider area. Of the 28.2 collisions per year reduction over the modelled area, 24.4 (61%) collisions were expected to be on the key links.
- The observed absolute reduction in collision numbers is lower than predicted for both the COBA modelled area and key links. The scheme has delivered an annual collision saving of 5.6 collisions (2% reduction) in the COBA modelled areas compared to the forecast of 28.2 collisions (5% reduction). The observed saving on the key links is 17.4 collisions (50% reduction) compared to a forecast saving of 24.4 collisions (61% reduction).
- The overall proportion saving is however generally in line with the forecast saving.

### Collision rates on the A3

- 3.31. The number of collisions along a length of road used together with AADT for the same section can be used to calculate a collision rate, known as PIC per million vehicle kilometres (mvkm). By looking at the rate it is possible to identify the impact of the scheme, eliminating any potential impact of traffic volume changes. As traffic flows on the A3 have increased considerably post opening it is interesting to look at the collision rate on the road.
- 3.32. The forecasting did not include any information on collision rates and consequently, the national average collision rates for a single and dual carriageway for the date periods collision data has been collected for have been calculated. This has been completed using the methodology stated in the COBA manual DMRB Volume 13, Section 1, Part 2, Chapter 5.
- 3.33. Table 3.7 presents the observed collision rates for the before and after scheme opening periods for the A3 improved sections and for the sections north and south extending from the scheme to the A31. These are compared with the national expected averages for the road type in the same time periods as used in the COBA model.

**Table 3.7 - Collision rates on the A3 trunk road (unadjusted)**

Section	Period	Road Length (km)*	Road Type	Accident Rate (PIC/mvkm)	
				Observed	National Rate for road type in mid-time period
South-west of scheme to A325	Before	7.9	Modern D2 'A' Road	0.119	0.152 (in 2005)
	FYA	7.9		0.112	0.3125 (in 2014)
Scheme	Before	8.0	Older S2 'A' Road	0.464	0.779 (in 2005)
	FYA	2.5	Older S2 'A' Road	Old Road (now A333)	
				0.596	0.696 (in 2014)
		7.7	Modern D2 'A' Road	New A3 including tunnel	
0.058	0.125 (in 2014)				
North-east of scheme to A31	Before	12.0	Modern D2 'A' Road	0.169	0.152 (in 2005)
	FYA	12.0		0.134	0.125 (in 2014)

\* Road Length measured in Mapinfo

\*2005 before and 2014 after

\*\*National speed limit zone

\*\*\*30/40 mph zone

- 3.34. Table 3.7 shows the following key points regarding collision rates:

- Before the scheme was built collision rates on the A3 scheme section were substantially lower (0.464 PICs/mvkm) than the national rates (0.779 PICs/mvkm) for an 'A' road of this type. The same pattern can be seen for the section of the A3 to the south west of the scheme, however collision rates on the section to the north east of the scheme were higher than the national average.

- Following the scheme opening, collision rates on the old A3 have increased but they remain below the national average collision rate. For the new A3 including the tunnel, the observed collision rate (0.058 PICs/mvkm) are considerably lower than the national average (0.125 PICs/mvkm) for this road type.
- Collision rates on the A3 to the north east of the scheme and the south west of the scheme have reduced following the scheme opening, however collision rates on the north-east section remain above the national average whilst collision rates on the south-west section remain below the national average.

## Statistical Significance

3.35. To determine whether the changes in collision numbers and collision rates observed before and after the scheme opened are statistically significant, a Chi-square test has been undertaken. This test uses the before and after numbers of collisions and traffic flows (for collision rates) to establish whether the changes are significant or are likely to have occurred by chance. Table 3.8 summarises the results.

**Table 3.8 - Statistical significance of change in collision numbers and rates**

Extent of analysis area	Statistical Significance Test	Statistical Significance of Results
		Result with counterfactual applied
A3 new and old route (key links)	Rate of collisions (PIC/mvkm) on compared with old route before (taking into account growth of traffic flows)	Significant**
Scheme section and A3 Hindhead	Collision numbers	Significant**
COBA modelled area	Collision numbers	Not significant*

\*\* at 95% and 99% confidence level

\*at 95% confidence level

## Fatalities & Weighted Injuries (FWI)

3.36. The collision rate discussed in the earlier section does not take into account the severity of collisions. To analyse this the Fatalities and Weighted Injuries metric is calculated which is a combined measure of casualties based on the numbers of fatal, serious and slight casualties. The FWI for before and after scheme opening period on the A3 are shown in Table 3.9. To take into account the increased traffic on the A3 and for comparison with other schemes, the FWI rate per billion vehicle kilometres (bvkm).

**Table 3.9 - FWI on the improved section of the A3**

Period	FWI/collision	FWI/year	FWI/bvkm
Three years before opening (2004 - 2007)	0.043	2.19	24.9
Five years after opening (Aug 2011 – June 2016)	0.078	1.32	9.5

- 3.37. Table 3.8 shows that despite the increase in traffic on the A3 five years after opening, the FWI/collisions shows that the seriousness of collisions has slightly increased, although FWI/year and FWI/bvkm has reduced.

### Road Safety Audit

- 3.38. The RSA completed in August 2016 includes an in-depth analysis of collisions on the new A3 road alignment and the old A3 network (from Hammer Lane Junction to Devil's Punch Bowl) and other adjacent roads<sup>16</sup>.
- 3.39. The RSA used data for a 53-month period from 29th July 2011 - 31st December 2015 and although this is a different time period compared to the data used in this POPE report, the findings complement this analysis.

### Change in collision numbers

- 3.40. Overall the RSA noted that the A3 Hindhead scheme has reduced all injury collisions in the affected areas by 69% from 37.3 per year to 11.5 per year. KSI collisions reduced by 63% from 7.3 per year to 2.8 per year, whilst KSI casualties reduced by 71% from 11.0 per year to 3.2 per year. However, the proportion of KSI collisions (severity index) in the after period increased from 19% to 24%. On the section of the A3 that has been by-passed, Hammer Lane to Devil's Punch Bowl, the number of collisions reduced by 90% from 23.0 per year to 2.3 per year.

### Collision locations

- 3.41. Of the 39 collisions recorded on the new A3, 22 vehicles involved vehicles losing control; 16 occurred on the northbound carriageway and six on the southbound carriageway. Two of the collisions on the A3 northbound carriageway involved vehicles losing control in standing water.
- 3.42. On the A3 northbound carriageway, 6 night time collisions were recorded on the section between Hindhead Hill underpass and Greensand Way underpass; five of these collisions involved vehicles losing control.
- 3.43. On the A3 southbound carriageway there were three locations each with two night-time collisions, south of Hindhead Tunnel, south of Hazel Grove Junction and near Hole Farm. Two of these collisions involved vehicles losing control and two involved lane changing or overtaking manoeuvres.
- 3.44. On the old/adjacent network there was one cluster of three slight injury collisions, on the A333 Portsmouth Road/B3002 Headley Roundabout. This cluster gives a collision rate of less than one per year and the collisions were different parts of the roundabout, and were too few and diverse to warrant any further investigation.
- 3.45. The RSA also noted that collisions were not at any common locations within the tunnel and no clusters were identified on the A3 and there was no dominant pattern to the one cluster identified on the old A3 (A333).

### Severity impact

- 3.46. The only road user group that showed an increase in collisions was pedal cyclists from zero before construction to three in the after period. One occurring on the A3 and the other two on the old network.

---

<sup>16</sup> The old and adjacent network defined in the RSA included Portsmouth Road (South), A333 Portsmouth Road, London Road and part of Punch Bowl Lane, Boundless Road and the A287 Hindhead Road.

- 3.47. On the old network (including the adjacent network), 12 collisions were recorded, with a severity index of 25%. The RSA reported that the severity index was higher than the national average (13.1%) for A-class roads with a 30/40mph speed limit.
- 3.48. On the new A3 alignment, 39 collisions were recorded, with a severity index of 23%. The RSA noted that this severity index was higher than the national averages (16.9%) for A-class roads with a 70mph speed limited between 2011 and 2014.

### **Collision characteristics**

- 3.49. The RSA analysed the weather and road surface conditions recorded in the collision data for the A3 and noted that the findings were generally consistent with the national averages for 2011-2014.
- 3.50. In addition, the RSA looked at the number of day and night collision occurrences recorded on the A3. A chi-square (statistical test) was undertaken on the ratio of daylight (51.3%) and dark collisions (48.7%) and compared it to values obtained from the reported road casualties in Great Britain 2011-2014 this returned a result that was significant.

### **Non-Motorised Users**

- 3.51. The RSA analysis demonstrates that the average number of collisions involving pedestrians reduced from 1.3 per annum to 0.5 per annum following the scheme opening, equating to a 64% reduction. At the same time, the number of collisions involving pedal cycles increased from 0 per annum to 0.7 per annum following the scheme opening. One of the collisions involving a cyclist was observed to have occurred on the A3 and the other two occurred on the old A3. The RSA reports that the cyclist collisions were not related to the scheme introduced and showed no common causality characteristics.

### **Recommended treatment works**

- 3.52. The RSA recommended options for treatment relating to night-time collisions and loss of control. These treatments included drainage options, reflectivity of lining and studs and improvements, where necessary. The outcome of these recommendations at the time of writing is currently unknown.

### **Security**

- 3.53. The aim of this sub-objective is to reflect both changes in security and the likely number of users affected. In terms of roads, security includes the perception of risk from personal injury, damage to or theft of vehicles, and theft of property for individuals or from vehicles.

### **Forecast**

- 3.54. The scheme AST states security is not applicable to this scheme.

### **Evaluation**

- 3.55. With reference to WebTAG Unit 3.4.2, the security sub-objective guidance suggests the only security indicators for a highways scheme of relevance to this scheme are landscaping and the visibility of lay-bys. This scheme included emergency only lay-bys on the tunnel exits which are clearly visible from the road. The tunnel and its approaches have CCTV system in place, used for active real-time monitoring which is considered to improve security. In addition, journey times on the old A3 have improved reducing risk to personal safety and belongings whilst queuing and average speeds demonstrate that queuing on the new A3 is not considered a problem. Figure 3.4 shows the emergency lay-bys and CCTV.

- 3.56. At OYA, a residents' survey was completed which identified that the majority of respondents either 'agreed' or 'strongly agreed' that safety for car users had improved since the scheme opened. For NMUs, 66% respondents in Hindhead either 'agreed' or 'strongly agreed' that safety had improved since the scheme opened, however in other areas the proportion was lower. Overall it is deemed that the residents' survey demonstrated that perceptions of safety has improved. More detail on the results of the residents' survey in relation to perceptions of safety can be found in the OYA report.
- 3.57. The new CCTV, provision of laybys, reduced journey times on the new and old A3 which is in addition to the improvement of safety perceptions evidenced by the OYA residents' survey, results in the scheme having a slight beneficial impact on security.

**Figure 3.4 - Emergency lay-bys and CCTV<sup>17</sup>, Google 2017 ©**



---

<sup>17</sup> Image from June 2016

## Key points from Safety Evaluation

### Collisions

- Annual average collision numbers have reduced by 5.6 within a wide area stretching from the Farnham (A31) to Haslemere after taking into account the widespread safety improvement trends observed over the same time period, which is a 2% reduction.
- Consideration of the impact of the scheme on the key links only shows that there has been an annual average reduction of 17.4 collisions annually, which is a 50% reduction when compared to the counterfactual before period.
- Statistical significance tests show that the reduction in collisions on the key links (scheme section) is statistically significant and is likely to have occurred as a result of the scheme, however the saving for the wider area is not statistically significant.
- The large majority of the collision savings have been on the key links, which is as predicted but the net savings is less than predicted due to the background reduction in collisions which has taken place nationally.
- On the key links, the collision rate before and after the scheme opening were below the national average for its road type. The change in collision rates following the scheme opening are statistically significant and likely to have occurred as a result of the scheme.

### Road Safety Audit

- The RSA found that there was a high number of night time collisions and vehicles losing control on the scheme, particularly at the northbound carriageway, options for treatments have been recommended.

### Security

- The new lay-bys are clearly visible from the road which is beneficial and the tunnel is monitored by CCTV.

## 4. Economy

### Introduction

4.1. This section presents an evaluation of how the scheme is performing against the DfT's economy objective, which is defined in WebTAG as:

*To support sustainable economic activity and get good value for money*

4.2. The five sub-objectives for economy are to:

- Get good value for money in relation to impacts on public accounts.
- Improve transport economic efficiency for business users and transport providers.
- Improve transport economic efficiency for consumer users.
- Improve reliability.
- Provide beneficial wider economic impacts.

4.3. When a scheme is appraised, an economic assessment is used to determine the scheme's value for money. The assessment is based on an estimation of costs and benefits from different sources:

- Transport Economic Efficiency (TEE) benefits (savings related to travel times, vehicle operating costs and user charges).
- Collision costs (savings related to numbers and severity level of collisions).
- Costs to users due to construction and maintenance.

4.4. This section provides a comparison between the outturn costs and benefits and the forecast economic impact, as well the scheme's wider economic impacts.

### Sources

4.5. The economic assessment presented in this section is based upon:

- A3 Hindhead Scheme Economic Appraisal Report (Oct 2003).
- A3 Hindhead Scheme Addendum to the Economic Appraisal Report (March 2006).
- COBA<sup>18</sup>.
- TUBA 1.619 which matches the benefit results presented in Addendum.
- The forecast cost has been taken from the Annexes to Cost increase submission of October 2006 and A3 Hindhead - Submission to PICG<sup>20</sup> (November 2007).
- Outturn costs from the Regional Finance Manager.

### Forecast Present Value Benefits

4.6. The appraisal of this scheme considered the economic impact in terms of present value. A summary of the predicted scheme impacts from the EAR is shown in Table 4.1.

---

<sup>18</sup> COBA is Cost Benefit Analysis and is DfT software used here for the assessment of safety benefits.

<sup>19</sup> TUBA is Transport Users Benefit Analysis, DfT software used for the assessment of economic benefits other than safety.

<sup>20</sup> Highways England's Project Investment Control Group.

**Table 4.1 – Economic impact of scheme**

Benefit Stream	Predicted Benefits 2002 marked prices, discounted		Evaluation
	£m	Evaluate?	Reasons
Journey Times	643.5	✓	Represents a considerable proportion of the overall scheme benefits. Outturn journey time impacts at the five year after stage can be calculated with relative ease using observed changes in vehicles hours based on FYA average journey times and flows.
Vehicle Operating Costs	-28.6	✓	Reasonable proportion of overall Transport Economic Efficiency (TEE) benefits. Impact calculated based difference between forecast and observed on indirect tax cost impact.
Safety	113.0	✓	Represents a reasonable proportion of the overall scheme benefits. Outturn assessment based on average collision saving.
Maintenance delay	-0.38	✗	Outside the realms of POPE methodology. Assumed to be as forecast.
<b>Total</b>	<b>727.5</b>		
Indirect Tax	31.6	✓	Substantial proportion of benefits. Reforecast using forecast and observed traffic flows and speeds. Ratio of results applied to monetary impact.
<b>Total</b>	<b>759.1</b>		

## Journey Time Benefits

### Forecast

4.7. Transport Economic Efficiency (TEE) benefits for this scheme were forecast using the Department for Transport's (DfT's) TUBA (Transport Users Benefit Analysis) program, which considers change in:

- **Time for Link Transit and Junction Delay** – the time on each affected link both before and after opening, weighted by vehicle flows and the delays at junctions; and
- **Vehicle Operating Costs (VOC)** – Reflects fuel and other operating costs calculated by a change in total distance travelled on the affected links, but also considering vehicle speeds.

4.8. TUBA modelling was based on the benefits in a wide area, but this evaluation focuses on the routes where changes can be most clearly identified as being linked to this scheme. There are three groups of users that were identified as measurably benefiting from the scheme which are:

- Those users of the A3 transferring over to the new route.
- Users transferring from other routes to the improved A3.
- Users of the A287, the other road at the former Hindhead crossroads.

- 4.9. The TUBA modelled forecast that the scheme would deliver TEE benefits of £615 million (2002 prices, discounted to 2002) over the 60-year appraisal period, comprising of circa £644 million of journey time benefits and an increase in vehicle operating costs of circa £29 million (as shown in Table 4.2). The impact of the scheme on journey times and vehicle operating costs are considered separately in sections below.

**Table 4.2 – Forecast TEE benefits**

TEE benefit stream	Benefit Value (£m)
Journey time benefits	643.5
VOC	-28.5
<b>Total</b>	<b>615.0</b>

### Evaluation

- 4.10. In order to assess the impact of the scheme on journey time benefits, for the user groups listed above, vehicle hour savings (based on the weekday peak periods, interpeak, overnight and weekends) have been calculated for the vehicles on the following routes (as shown in the surveyed routes map in Figure 2.10):

- A3, between A325 and A31 comparing the times on the old road via Hindhead with new road via the tunnel.
- A287 formerly via crossroads with A3.

- 4.11. Additional traffic in the corridor, which is the traffic attracted by the improved A3, was attributed with half the benefits using the economic principle of rule-of-half in line with WebTAG guidance. The annual vehicle hour saving is shown by route in Table 4.3.

**Table 4.3 - Vehicle hour savings**

Routes as shown in Figure 2.10	Annual Vehicle Hour Saving (hours)
A3 – Old route via crossroads vs. New Route via tunnel (brown route)	1,761,420
A287 – formerly via crossroads, now double mini-roundabouts (dark blue route)	45,661
<b>Total saving</b>	<b>1,807,080</b>

- 4.12. The forecast benefits were based primarily on the benefits in the A3 corridor. It is not possible to use TUBA outputs to create a comparable forecast based on the impacts on these two routes only as TUBA is matrix based and its output does not give any breakdown of the impacts by link or area.

- 4.13. The reforecast monetised benefits are based on the number of vehicle hours saved. The Value of Time VOT (b) is taken from the PAR 6.2 Guidance Table C.6 which specifies a value of time for the average vehicle in the opening year, which is £12.24. Extending the benefits over 60 years is based on predictions of traffic growth and the results are presented for the range from zero growth to the national forecast (NTEM).

- 4.14. The results in Table 4.4 show that the reforecast TEE benefits over the appraisal period of 60 years are ~£644 million with no change in traffic growth and £809 million

for NTEM traffic growth. These outturn results have been compared with the forecast TEE benefits.

**Table 4.4 – Journey time benefits: Forecast vs. Outturn**

2002 prices, discounted	Forecast (taken from EAR)	Re-forecast Outturn based on PAR guidance <sup>21</sup>	
		0%	NTEM
Journey time benefits	£643.5m	£633.2m	£809.2m

- 4.15. Comparison with the outturn benefits shows that with 0% growth in traffic, the reforecast benefits are £10.3 million lower (2%) than forecast. With the application of NTEM traffic growth, the outturn benefits are £165.7 million higher than forecast, equating to 26%.
- 4.16. Following the downturn in traffic volumes following the economic recession, national datasets on traffic volumes suggest that traffic volumes are in the process of recovering thus are increasing. With this in mind, it is assumed that traffic growth will continue in future and consequently the reforecast journey time benefits using NTEM traffic growth will be used in the reforecast value for money (Benefit Cost Ratio) covered later in this chapter.

## Vehicle Operating Costs

- 4.17. WebTAG guidance states that the use of the road system by private cars and trucks gives rise to operating costs for the user. These are fuel and non-fuel costs, where fuel is the majority cost.

### Forecast

- 4.18. In the case of this scheme, the forecast changes in Vehicle Operating Cost (VOC) are a negative benefit for users (costs to users has increased) and make up a considerable part of the overall forecast Transport Economic Efficiency benefits (as displayed earlier in Table 4.2). For this reason, it has been necessary to evaluate the impact.
- 4.19. The EAR stated that the forecast disbenefit was due to some drivers rerouting to use routes via the A3 which were longer than in the Do Minimum scenario. It may also be due to higher speeds and hence higher fuel consumption.

### Evaluation

- 4.20. For most highway schemes including this one, the VOC and indirect tax impacts are both very closely linked to changes in fuel consumption which has similar magnitude of impacts, but from opposite sides of the benefits balance. That is, if there is increased fuel consumption, VOC will increase due to users paying for fuel (i.e. as disbenefit) and thus more indirect tax will be collected by the Treasury which is considered to be a benefit according to current guidance. Given this relationship, the reforecast impact of the scheme has on vehicle operating costs has been calculated based on the reforecast indirect tax impact, which is covered in a proceeding section in this chapter. The ratio between the forecast and reforecast impact of the scheme on indirect tax has been applied to the forecast vehicle operating cost to calculate a reforecast. The results are presented in Table 4.5.

<sup>21</sup> PAR 6.2

**Table 4.5 – Forecast and reforecast VOC**

Present Value Benefits (£m 2002 prices, discounted)	Forecast	Reforecast
Vehicle Operating Costs (VOC)	-28.5	-40.7 (43%)

- 4.21. The results show that the increase in vehicle operating costs is higher (~40%) than forecast. This is largely a result of the observed traffic volumes being greater than forecast, which subsequently results in more vehicle operating costs.

## Safety Benefits

### Forecast

- 4.22. For the purpose of assessing the economic impacts of road schemes, changes in safety as measured by changes in collision numbers and severity are monetised. Forecasts are generated using the methods and collision rates contained in the COBA Manual (DMRB Volume 13, Section 1) and embodied in the computer program COBA.
- 4.23. The safety impact of the scheme was appraised over the study area shown in Figure 3.1 which included the A3 corridor and an area extending up to the A31.
- 4.24. The final EAR stated that:
- 'over 65% of the total collision benefits would occur in the A3 corridor between Boundless Road and Hammer Lane (i.e. over the approximate length of the scheme). Other benefits would occur on the local road network as a result of traffic rerouting to the scheme.'*
- 4.25. The prediction was only for central growth in COBA and was £113m for 60 years.

### Evaluation

- 4.26. The evaluation of the outturn safety benefits is based on the forecast 60-year safety benefits, and the comparison between the forecast and observed saving of collisions five years after construction. These are based on the impact for the whole study area as modelled in the original COBA. The outturn collision saving is that comparing the difference between the numbers of collisions in the post opening period with the counterfactual scenario (based on the before scheme data and taking into account the background reduction).
- 4.27. Monetisation of the outturn collision saving is carried out by:
- Calculating the net difference between the forecast and observed savings in the study area.
  - Monetising the net difference using the PAR method which values collisions by road type and gives capitalisation factors over 60 years based on expected traffic growth.
  - Calculating the 60-year outturn benefits for the whole area by combining the forecast from COBA for the whole study area with the outturn assessment of the net difference for the narrow area.
- 4.28. The results of this approach are displayed in Table 4.6.

**Table 4.6 - Outturn Economic Evaluation of Safety Benefits**

<b>Forecast</b>	Collision saving in opening year	28.2	
	Saving over 60 years (£m)	£113.0	
<b>Outturn<sup>22</sup></b>	Average annual collision saving in first five years	5.6	
	Saving over 60 years (£m)	0% Growth	£31.3
		NTEM Growth	£5.2
<b>Difference</b>	Collision saving in opening year	-22.6	
	Saving over 60 years (£m)	-£81.7 (0% Growth) -£107.4 (NTEM Growth)	

4.29. The key points for the outturn safety outturn benefits are:

- The collision saving has been observed to be lower than forecast and as such the 60 year monetary benefits are also lower.
- Outturn safety benefits are reforecast to be £31.3 million with 0% growth in traffic flows and £5.2 million with NTEM growth in traffic.

4.30. The reforecast safety benefits form part of the reforecast value for money statement (Benefit Cost Ratio). In order to be consistent with the reforecast journey time benefits, the outturn results assuming NTEM growth will be used to inform the value for money statement, which is covered in proceeding sections.

### Summary of Present Value Benefits

4.31. Table 4.7 shows the total benefits as described earlier, including the assessment of PVB with VOC but not indirect tax revenue (as was the approach for the original appraisal). The results show that the reforecast outturn benefits are £773 million, £45 million (6%) higher than forecast. This difference is largely due to the journey time benefits being higher than expected.

<sup>22</sup> PAR 6.2

**Table 4.7 – Summary of forecast and observed PVB**

Benefit Stream	Benefits £m 2002 market prices, discounted to 2002	
	Forecast	Outturn Estimate
Journey Times	643.5	809.2
Vehicle Operating Costs	-28.5	-40.9
Maintenance Delays	-0.38	-0.38
Safety	113.0	5.2
<b>Total PVB</b>	<b>727.6</b>	<b>773.4</b>

## Indirect Tax Revenues Impact

### Forecast

4.32. Indirect tax revenue impact is the expected change in indirect tax revenue to the Government due to changes in the transport sector as a result of the scheme over the appraisal period. For the highways scheme in this study, the tax impact is derived primarily from the monetisation of forecast of the changes in fuel consumption over the 60 years period. A scheme may result in changed fuel consumption due to:

- Changes in speeds resulting in greater or lesser fuel efficiency for the same trips.
- Changes in distance travelled.
- Increased road use through induced traffic or the reduction of trip suppression.

4.33. Note that at the time this scheme was appraised, costs were taken for the wider costs to public accounts and thus the impact of the scheme on indirect tax was considered within these wider costs. The current guidance<sup>23</sup> (AMCB, Analysis of Monetised Costs and Benefits) considers the costs in terms of the 'broad transport budget' i.e. costs and revenues which directly affect the public budget available for transport and the indirect tax impact is covered within the benefits. This section assesses the impact of the scheme on indirect tax as per the guidance approach at the time of the scheme's appraisal.

### Evaluation

4.34. Forecasting of the impact was done within the TUBA modelling. This showed that the scheme was expected to increase tax revenue over the 60-year appraisal period. To assess the outturn impact, the impact on the A3 corridor has been calculated and compared with the forecast. A ratio method between forecast and outturn has then been applied to calculate the impact over the appraisal period for the study area.

<sup>23</sup> TAG UNIT A1.1 Cost-Benefit Analysis, October 2013

**Table 4.8 - Indirect tax as Present Value (£m)**

Present Value £m (Costs in 2002 market prices, discounted)	Forecast	Outturn
Change to indirect tax revenue as impact on public accounts	-31.6	-45.1 (43%)

4.35. This evaluation shows that the scheme is expected increase indirect tax over the 60-year period, thus based on the guidance at the time of appraisal, more indirect tax would reduce the overall cost of the scheme to the Treasury. The outturn assessment demonstrates that the amount of indirect tax impact is 43% higher than expected. The extra tax revenue is largely due to the greater volumes of traffic than forecast resulting in higher fuel consumption.

## Scheme Costs

4.36. This section compares the forecast costs of the scheme as of the start of the construction period with the actual spend at the time of this study.

4.37. Investment costs are considered in terms of a common price base of 2002 for comparison with forecast. For comparison with the benefits, overall costs are expressed in terms of present value, termed Present Value Cost (PVC) discussed below.

4.38. The investment cost is the cost to Highways England for the following:

- Costs of construction.
- Land and property costs.
- Preparation and supervision costs.
- Allowance for risk and optimism bias.

4.39. The last pre-construction forecast of the investment costs was in May 2007 which was a slight revision on the cost in the scheme brief dated November 2006 which followed the secretary of State's approval for the scheme cost increase and Order Publication (23rd October 2006). The costs considered include those incurred since 2001. As noted in the introduction, there is a lengthy history to the dualling of this section of the A3. Work in the 1980s and 90s included consultation, planning work of the earlier surface level preferred route and properties acquired under blight.

4.40. The A3 Hindhead scheme as built was one of the first to use the Early Contractor Involvement (ECI) and the contract used was unique<sup>24</sup>.

4.41. When the scheme was formally approved in October 2006 and entered the road programme the cost was expected to be £371million at 2006 Q2 prices. The final cost estimate in May 2007 revised this to £367.8m<sup>25</sup>. This figure is used in this evaluation as the final pre-construction forecast cost.

4.42. The outturn spend profile for this scheme has been obtained for the purpose of this study and covers the period 2001 – 2016. For the purpose of comparison between forecast and actual, and with other major schemes, prices have been converted to

<sup>24</sup> It was based on the ECC Option C Target Cost Contract with Option N inflation clauses. Inflation was calculated from Baxter indices for Civils Works and BEEMA indices for the M&E work in the tunnel. The Contract was awarded in September 2002 on a quality/price basis.

<sup>25</sup> MP Director's Instruction 06/07, ANNEX 1 version 1.2.

2002 prices. This figure can then be compared with the forecast cost on a comparable basis.

4.43. Comparison between the forecast and outturn is presented in Table 4.9.

**Table 4.9 - Scheme Costs (£m)**

Forecast Cost (May 2007)		Outturn Cost		Difference
Major Projects Director's Instruction	367.8	As spent costs in 2001-2013 years and prices	370.9	-
Cost in £million 2002 prices, undiscounted	328.0	Cost, 2002 prices, undiscounted	315.7	-12.3 (3.8%)

4.44. Table 4.9 shows that the outturn cost of the scheme is £12.3 million (4%) lower than forecast.

## Present Value Costs (PVC)

4.45. Cost benefit analysis of a major scheme requires all the costs to be considered for the whole of the appraisal period and they need to be expressed on a like-for-like basis with the benefits. This basis is termed Present Value. Present Value is the value today of an amount of money in the future. In cost-benefit analysis, values in differing years are converted to a standard base year by the process of discounting giving a present value.

4.46. Following current Treasury Green Book guidance, calculation of the present value entails the conversion to market prices, then discounting by year. This using a rate of 3.5% for the first 30 years and 3% thereafter.

4.47. The full PVC is made up of the following costs converted to present value:

- Investment costs, as above but converted to present value.
- Operating costs, during the lifetime (60 years) of the scheme.
- Indirect Tax Revenues during the lifetime (60 years) of the scheme.

## Investment Cost

4.48. The final TUBA model (2005) and the AST both present the PVC as £239m, but this is based on older version of the cost forecast. As such, the final forecast for the investment cost has been revaluated to a present value cost. This revised value is presented in Table 4.10. This is the 2002 costs, expressed in market prices discounted at the annual rate of 3.5%. The outturn costs are presented likewise.

4.49. Table 4.10 also presents the outturn cost, as obtained from the Regional Finance Manager. The outturn cost is £315.6 million, which is £6.4 million (2%) lower than forecast.

**Table 4.10 - Investment Costs as Present Value (£m)**

Present Value £m (Costs in 2002 market prices, discounted)	Forecast	Outturn
Investment costs	322.0	315.6

## Maintenance and Operating Costs

- 4.50. For this scheme, as it included a major tunnel, there are much greater maintenance and operating costs for future years than for a similar section of new dual carriageway above ground, thus the assessment of the costs must include the commitment to ongoing annual maintenance and a refurbishment programme to cover the 60 years over which the scheme is appraised and for the purpose of comparison of the costs and benefits over this period.
- 4.51. The annual routine maintenance and operating costs for the scheme as a whole was estimated to be £995,800 per year in 2002 prices. This includes costs for tunnel lighting, ventilation, electrical systems, fire detection and control, communications; traffic management, energy supplies and operating costs. The total over 60 years would be £59.7m.
- 4.52. Estimated costs for the renewal and refurbishment of tunnel equipment were also covered in the scheme appraisal. These would be incurred at 10, 20, 25, 30 and 50 year intervals, and would total about £106.3 million, in 2002 Q1 prices. In the appraisal, they were modelled as operating costs.
- 4.53. For the purpose of comparing these costs with the benefits, costs are converted into present value, through conversion of market prices then discounting by year using the current Treasury Green Book guidance. This uses a rate of 3.5% for the first 30 years and 3% thereafter. Table 4.11 summarises these forecasts in the 2002 prices and when converted to present value.

**Table 4.11 - Forecast Maintenance and Operating Costs (£m)**

<b>£m (Costs in 2002 market prices, discounted)</b>	<b>Costs in 2002 prices</b>	<b>Present Value</b>
Maintenance (annual for 60 years)	59.7	23.4
Operating costs (renewal & refurbishment)	106.3	31.5
<b>Total</b>	<b>166.1</b>	<b>54.9</b>

- 4.54. For this evaluation, these costs are still almost entirely still in the future and there has been no reforecasting of them, thus it is assumed that these costs will be as forecast.

## Summary of Present Value Cost

- 4.55. Table 4.12 shows the total of the present value costs, with the historic and current approach to indirect tax.

**Table 4.12 - Summary of Present Value Costs (£m)**

<b>Costs in £m 2002 market prices, discounted</b>	<b>Forecast</b>	<b>Outturn</b>
Investment	322.0	315.6
Operating costs	54.9	54.9
<b>PVC (excl. indirect tax impact)</b>	<b>376.9</b>	<b>370.5 (-2%)</b>
Indirect tax impact as cost to public accounts	-31.6	-45.1
<b>Total PVC (including indirect tax)</b>	<b>345.3</b>	<b>325.3 (-6%)</b>

- 4.56. The results show that the outturn cost with indirect tax considered as part of the cost is lower than forecast by £20 million (6%). This is primarily due to more indirect tax being generated as a result of higher than forecast traffic volumes. When indirect tax is not considered as part of the cost, the outturn cost is £6.4 million (2%) lower than forecast.

## Benefit Cost Ratio

- 4.57. The Benefit Cost Ratio (BCR) is an indicator used in the cost-benefit analysis of a road scheme that attempts to summarise the overall value for money of a project or proposal. The BCR is the ratio of benefits of a project or proposal, expressed in monetary terms, relative to its costs, also expressed in monetary terms. All benefits and costs are expressed in present values. Projects with a BCR greater than 1 have greater benefits than cost, thus providing positive net benefits.
- 4.58. At the time of scheme appraisal, WebTAG guidance was to include indirect tax impact as part of the cost, however most recent guidance on indirect tax recommends that it is included as part of the benefits. This means that when a scheme such as this leads to increased fuel consumption and thus increases indirect tax revenue, the PVB is increased rather than the PVC being decreased.
- 4.59. Table 4.13 shows the calculation of the BCR using the costs and benefits presented earlier in this chapter, with indirect tax considered as part of the PVC (historic appraisal approach) and as part of the PVB (most recent appraisal approach).

**Table 4.13 – Benefit Cost Ratio (£m)**

Benefits £m 2002 market prices, discounted to 2002		Forecast	Outturn Estimate
Indirect tax in costs	Present Value Benefits (PVB)	727.6	773.4
	Present Value Costs (PVC)	345.3	325.3
	<b>Benefit Cost Ratio</b>	<b>2.1 (High VfM)</b>	<b>2.4 (High VfM)</b>
Indirect tax in benefits	Present Value Benefits (PVB)	759.2	818.5
	Present Value Costs (PVC)	376.9	370.5
	<b>Benefit Cost Ratio</b>	<b>2.0 (High VfM)</b>	<b>2.2 (High VfM)</b>

- 4.60. The key points to note from Table 4.13 are:
- Considering indirect tax as it was in the original appraisal (within the costs) demonstrates that the scheme was expected to deliver medium value for money (BCR of 2.1) and this evaluation shows that the scheme has delivered medium value for money (BCR of 2.4). The primary reason for the outturn BCR being better than the forecast BCR is due to the PVB being approximately £45 million higher than forecast. The lower than expected safety benefits are more than outweighed by the higher than expected journey time benefits.
  - Including indirect tax in the benefits shows that the scheme was forecast to deliver medium value for money (BCR of 2.0) and has delivered high value for money (BCR 2.2). This BCR is slightly higher than the forecast BCR which is also due to the higher than expected PVB.

- 4.61. It should be noted that the BCR ignores non-monetised impacts. In the Transport Business Case guidance, the impacts on wider objectives must be assessed but are not monetised. The evaluations of the wider economic impacts, environmental, accessibility and integration objectives are covered in the following sections of the report.

## Wider Economic Impacts

### Forecast

- 4.62. The AST forecast that although no regeneration area would be directly affected by the scheme, the scheme would have a “Moderate Beneficial” impact on wider economic impact as:
- South Hampshire could benefit from the improved transport connection.
  - The blighted part of Hindhead should recover when relieved of major traffic flows.

### Outturn

- 4.63. The greatest wider economic impacts are for South Hampshire which are likely to be benefitting from the substantial improvements in journey times and reliability on the A3, the key strategic link between South Hampshire and Portsmouth and the M25.
- 4.64. The large reduction in traffic on the old A3 of between 8,000 and 14,000 vehicles per weekday and at Hindhead cross roads of around 20,000 vehicles per weekday has improved the formerly bighted part of Hindhead, as shown in Figure 6.2 (following chapter).
- 4.65. Based on the improved transport links for South Hampshire, the impact of the scheme on wider economic impacts is “moderate beneficial”, which is as expected.

## Key Points from Economic Evaluation

### Present Value Benefits

- The outturn assessment of the benefits shows that the scheme will deliver benefits of £773 million over the 60-year period, when indirect tax is not considered as part of the benefits. These benefits are higher than the forecast benefits of £728 million.
- The outturn benefits are greater than the forecast benefits primarily due to the journey time benefits being higher than expected. The scheme will deliver journey time benefits to the value of £809 million, compared to the £644 million forecast. The higher than forecast benefits is largely the result of traffic volumes being observed to be higher than forecast.
- The outturn assessment of safety benefits is lower than forecast, however this is offset by the higher than expected journey time benefits, resulting in the overall higher than forecast benefits.
- Due to observed traffic volumes being greater than forecast, vehicle operating costs are higher than expected.

### Present Value Costs

- The outturn scheme investment cost is £316 million, which is lower than the £322 million forecast.
- Maintenance and operating costs were expected to be incurred in future years due to the major tunnel implemented as part of the scheme. The total maintenance and operating cost over 60 years was forecast to be £55 million comprising of £23 million of maintenance costs and £32 million of operating costs. These costs are still almost entirely still in the future and there has been no reforecasting of them, thus it is assumed that these costs will be as forecast.

### Benefit Cost Ratio

- The outturn BCR is better than expected due to the combined outcome of higher than forecast benefits and lower than forecast costs. The forecast BCR was 2.0 and the outturn BCR is 2.2, however both are considered to demonstrate that the scheme is delivering high value for money.

### Wider Economic Impacts

- South Hampshire are likely to benefit from the improved journey times and reliability on the A3, the key strategic link between South Hampshire and Portsmouth and the M25. The impact of the scheme on wider economic impacts is therefore “moderate beneficial”, which is as expected in the appraisal.

## 5. Environment

### Introduction

- 5.1. This section documents the evaluation of the impacts of the scheme on the environmental sub-objectives.
- 5.2. The Environmental Statement (May 2004) (ES) lists key environmental issues related to the scheme. It states that “The area through which this section of the A3 passes is an environmentally sensitive area in terms of landscape, biodiversity and heritage. With statutory designations as listed below”:
- The area lies within the Surrey Hills Area of Outstanding Natural Beauty (AONB).
  - The A3 passes through the Devil’s Punch Bowl Site of Special Scientific Interest (SSSI), which is also designated part of the Wealden Heaths Special Protection Area (SPA) under the EU Directive on the Conservation of Wild Birds.
  - Much of the area is owned inalienably by the National Trust for the benefit of the Nation.
- 5.3. These designations placed severe constraints on options for improving the A3 while complying with Government policy on minimising the impact of transport schemes on environmentally sensitive areas.
- 5.4. The ES included the following key objectives pertinent to the environment:
- Beneficial impact on noise and air quality for local people and Hindhead Common.
  - Substantial gains for the historic landscape of Hindhead Common as a result of removal of the existing surface route, but these would be partially offset by the severe impacts either side of the tunnel.
  - Overall a slight beneficial impact on the Surrey Hills AONB.
  - No direct impacts on the Devil’s Punch Bowl SSSI/SPA and a beneficial indirect impact by removing the surface route and re-uniting the commons.
- 5.5. The non-technical summary report states that the scheme would:
- Have an overall beneficial environmental impact.
  - Result in considerable adverse impacts from site clearance, construction and operation of the scheme particularly through the Hazel Grove, Tyndall’s Wood area and through the Boundless Valley.
- 5.6. However, it was expected that these adverse impacts would be offset by:
- The beneficial influence of removing the A3 around the Devil’s Punch Bowl.
  - Reducing congestion and community severance.
  - Improving recreational access.
  - Enhancing the habitat value of the area.

### Data Collection

- 5.7. The following documents have been used in the environmental evaluation part of this study:
- Appraisal Summary Table (AST), October 2006
  - Environmental Statement (ES) Volumes 1, 1a and 2, May 2004
  - As Built drawings
  - Works Information
  - Landscape and Ecology Management Plan and drawings (2012)
  - Ecology Report December 2012

- Monitoring of vegetation establishment on the restored A3 corridor 2016
- Invertebrate Monitoring, 2014 at Boundless Copse
- Dormouse monitoring report November 2015
- Breeding bird monitoring November 2016
- Annual ecology monitoring summary report 2015
- Final ecology monitoring summary report 2016
- Reptile monitoring report 2016

5.8. Further details on the sources available for the environmental evaluation can be seen in Appendix B.

## Site Inspections

5.9. A site visit was undertaken in August 2016. Photomontages were available in the ES with one used for comparison in this report. All photographs taken for inclusion in this report were taken at this time. Where relevant, OYA photographs have been used to demonstrate changes in maintenance practices over time.

## Consultations

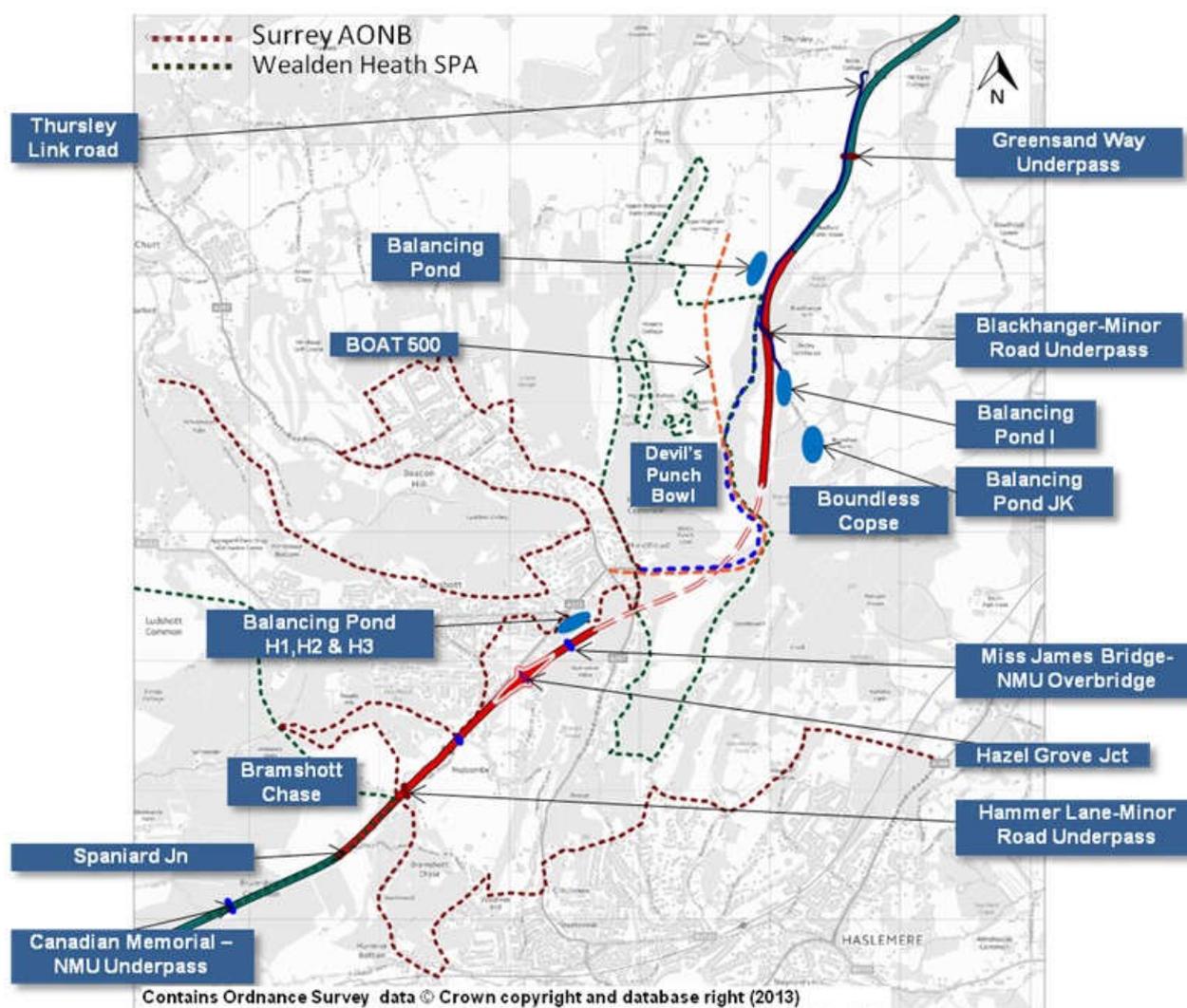
5.10. Table 5.1 lists the organisations contacted regarding their views on the impacts they perceive the road scheme has had on the environment, and whether they feel that the mitigation measures implemented have been effective.

**Table 5.1 - Summary of environmental consultation responses**

Organisation	Field of Interest	OYA Comments	FYA Comments
Environment Agency	Water	No response received at the time of submission.	No further contact made.
Natural England	Biodiversity and landscape	Responded that, essentially, the scheme has had positive benefits to biodiversity and the designated sites that surround the scheme. (see detailed response in the Biodiversity section).	No response received at time of submission.
English Heritage	Archaeology	No response received at the time of submission.	Cultural heritage scoped out of the FYA assessment.
National Trust	Biodiversity and landscape	Responded that the impacts on protected species, breeding birds and bird's nest orchid has been better than expected. Impacts on woodland, grassland and other habitats associated with the highway boundary has been as expected. The provision of new habitats alongside the scheme and off-site by agreement has been better than expected. (full response has been included in the main report).	No response received at time of submission.
Surrey County Council	General	Responded on PROW.	No response received at time of submission.

British Horse Society	PROW	No response received at time of submission.	No further contact made.
Ramblers Association	PROW	Positive comments included in the physical fitness section.	No response received at time of submission.
Surrey Hills AONB	Biodiversity	Comments received have been included in the main report.	No response received at time of submission.
Grayshott Parish Council	General	Comments received for noise, landscape, biodiversity, physical fitness and water quality and drainage.	Comments received for noise, landscape and heritage.

Figure 5.1 - Key environment references



### Animal Mortality

5.11. The Managing Agent Contractor (MAC) has been consulted with regard to animal mortality figures. Data was supplied for an incident occurring in August 2015 where a badger mortality was noted near Thursley link road off slip between the north and

south bound carriageways. This is not considered significant and will not be discussed further within the Biodiversity section.

### **Traffic Forecasts and Evaluation**

- 5.12. Three of the environmental sub-objectives (noise, local air quality and greenhouse gases) are directly related to traffic flows. No new environmental surveys are undertaken for POPE and an assumption is made that if the observed level of traffic is in line with forecasts, then it is likely that local noise and air quality are as expected.
- 5.13. The traffic forecasts used in the noise and local air quality appraisals from the ES were for the years 2009 and 2024. To compare with the observed flows, the forecasts have been interpolated between these two years to get proxy forecasts for 2016 and the comparison is summarised in Table 5.2.
- 5.14. No forecast traffic speeds or percentage HGVs were included for comparison in the ES or the Traffic Forecasting Report.
- 5.15. The traffic figures below show that observed traffic on the new road is higher than expected. Traffic on the former route and feeder routes has been significantly lower than predicted on some roads, but also significantly higher than predicted on others. This is explained further in the traffic section of this report.

**Table 5.2 - With the scheme (2016) traffic flows: Observed vs. Forecast**

Location/ Link	ADT				
	Pre-Scheme observed traffic flows (2007)	ES Forecast Interpolated to 2016	Observed (FYA 2016)	Difference (2016)	% Difference
New A3 in Tunnel	-	40,210	49,400	9,190	23%
Former A3 between junction with new A3 and B3002 Headley Road	24,200	14,480	14,300	-180	-1%
Former A3 between Tower Rd and B3002 Headley Road	30,100	15,147	15,300	153	1%
Thursley Road		2,173	1,900	-273	-13%
A287 Churt Road	6,700	10,980	5,700	-5,280	-48%
B3002 Headley Road East of Fiveways	7,700	7140	7,200	60	1%
B3002 Headley Road near A3 junction	6,400	8,187	7,700	-487	-6%
Crossways Road East of Fiveways	3,800	4,287	3,500	-787	-18%
Crossways Road near A3 junction	3,100	6,380	3,800	-2,580	-40%
Hammer Lane	2,900	5,640	4,500	-1,140	-20%
Knockhundred Lane	880	993	1,300	307	31%
B2131 Liphook Road	8,000	11,227	8,000	-3,227	-29%
High Pitfold	620	547	300	-247	-45%
A287 Hindhead Road	11,700	15,120	12,900	-2,220	-15%
A286 Grayswood Road	10,000	12,447	7,300	-5,147	-41%

## Noise

### Forecast

#### AST

- 5.16. The 2006 AST stated that there would be a substantial reduction in noise in parts of Hindhead. Tranquillity would be restored to a large area within Hindhead Common and the Devil's Punch Bowl. There would be some effects from redistributed traffic on existing roads.
- 5.17. In the long term, it was estimated that, with the scheme, there would be a decrease in the estimated population annoyed by noise by 15.

### Non-Technical Summary of the Environmental Statement

- 5.18. The Non-Technical Summary stated that noise from the then existing A3 affected every building within several hundred metres and spread well into Hindhead Common and the Devil's Punch Bowl, where traffic could be heard in most areas.
- 5.19. To minimise noise from the new road, noise barriers or earth mounds would run along both sides from Bramshott Chase to the tunnel. There would also be extensive earth mounding north of the tunnel. All newly constructed roads would be surfaced with a thin wearing course which would noticeably reduce noise.

**Figure 5.2 – Along northern side of scheme showing bunding and environmental barrier (OYA view first, with FYA below)**



- 5.20. It was predicted that the scheme would achieve a moderate noise reduction to the south of Hindhead Crossroads and a substantial reduction to the north. The tunnel would restore tranquillity to large areas of Hindhead Common and the Devil's Punch Bowl, with greatest benefits close to the existing A3. However, there would be some local increases in noise in Tyndall's Wood and Boundless Valley.
- 5.21. Noise levels were predicted for over 700 houses. Forecasts indicated that, on opening, about 320 properties would benefit from perceptible decreases in noise, of which 45 would be moderate or substantial. Some 240 would have perceptible increases in noise, of which 8

would be moderate or substantial. If the scheme was not built, noise levels would continue to rise, with perceptible increases at some 190 houses and decreases at only 14.

## Environmental Statement

- 5.22. The ES further stated that the tunnel would be a strategic mitigation measure that would have the effect of containing the noise source, rather than relocating it.

**Figure 5.3 - Environmental barriers screening properties near Spaniard junction**



- 5.23. The ES concluded that the effect of diverting traffic from the existing A3 to the tunnel would restore tranquillity to large areas of Hindhead Common and the Devil's Punch Bowl. The reductions would be most significant next to the existing A3.

## Consultation

- 5.24. Grayshott Parish Council responded as follows:

*“Noise is a very real problem. Since the Hindhead Tunnel has opened this has affected more people than expected. There is a constant background noise which increases during rush hours. It was felt that this was probably due to the fact that traffic is constantly moving whereas pre-tunnel it was often crawling or at a standstill. The area this affects is greater than pre-tunnel too. Residents in Tudor Close and Kingswood Firs are very aware of more traffic noise.”*

## Evaluation

### OYA Evaluation

- 5.25. The OYA evaluation showed that observed traffic flows were as expected on the new A3 when compared with those predicted in the ES for the Do Something scenario. Variations in traffic flows on the old A3 and feeder roads demonstrated changes in predicted traffic flows, with both lower than expected flows (less than 20% of predictions) and greater than expected flows (greater than 25% of predictions) encountered within the scheme assessment area. Overall, the scheme was expected to achieve an ‘as expected’ assessment although the former A3 between the junction with new A3 and B3002 Headley Road may have experienced significantly higher noise volumes during peak traffic hours.

### FYA Evaluation

- 5.26. To address the comments received from the Grayshott Parish Council, there is a decrease in observed traffic locally in Grayshott. However, there is an increase in traffic using the new A3 which will contribute to background traffic noise being experienced locally.
- 5.27. Overall, the new A3 alignment has a greater than predicted traffic flow of 23%. POPE methodology for noise states that only if traffic flows are 25% more or 20% less will there be a change from ‘as expected’. As the A3 is mostly in cutting or in a tunnel it is assumed that the increase in traffic flow will result in an as expected impact on noise for receptors closer to the road.

5.28. In contrast to this greater than predicted increase in traffic along the new A3, remaining traffic flows are mostly significantly lower than predicted which results in a locally **as expected** or **better than expected** evaluation. There is one exception to this along Knockhundred Lane where a 31% higher traffic volume is noted which according to POPE methodology is assessed as worse than expected. However, as this equals 307 cars on average per day more, it is not considered significant.

**Table 5.3 - Summary of Effects on Noise**

Origin of Assessment	Summary of Effects on Noise	Assessment
AST	Substantial reduction in noise in parts of Hindhead. Tranquillity would be restored to a large area within Hindhead Common and The Devil's Punch Bowl. Some effects from redistributed traffic on existing roads.	Estimated population annoyed by noise would be reduced by 15.
EST	Based on traffic flows along the old A3 and its connecting routes, it is likely that there has been an improvement in most areas, and neutral in others.  Traffic flows along the A3 are as expected.	Overall, better than expected or as expected along offline route.  As expected along the new A3 and surrounding receptors.

## Local Air Quality

### Forecast

#### AST

- 5.29. The 2006 AST stated that no Air Quality Management Area (AQMA) currently existed for Hindhead. It further stated that no air quality limit values would be exceeded in the opening year.
- 5.30. The AST stated that for most roads affected by changes in traffic, there would likely to be an air quality improvement at residential properties. Only a few roads would experience deterioration in air quality. The deterioration was not considered significant.

### Non-Technical Summary of the Environmental Statement

- 5.31. The non-technical summary stated that, as a result of improving vehicle design, it was expected that emissions of pollutants and particles from road traffic would decline significantly between pre-scheme implementation and the opening year. The scheme would alleviate local congestion with subsequent reduction in emissions. The impact of the scheme in terms of health effects on the local population and sensitive ecology would be positive. None of the air quality objectives would be breached as a result of the scheme at residential properties or public rights of way. The majority of local residents would experience a reduction in exposure to traffic-related air pollution.

### Environmental Statement

- 5.32. The ES further stated that:
- The limit value of Nitrogen Oxides (NOx) for the protection of vegetation was widely breached across the study area. However, NOx concentrations within the area of the Devil's Punch Bowl SSSI would be reduced by up to 40% with the scheme and would be improved sufficiently to be within the limit value for the protection of vegetation.
  - The contribution made by road traffic to acid deposition would reduce significantly between 2002 and scheme opening for both the Do Minimum and Do Something scheme scenarios.

### Consultation

- 5.33. POPE received no response to consultation for air quality.

## Evaluation

### OYA Evaluation

- 5.34. It was reported that average traffic flows on the old A3 and feeder roads was mostly lower than predicted, indicating air quality was overall better than expected. The new A3 traffic flows were as expected; indicating air quality was as expected.

### FYA Evaluation

- 5.35. Based on POPE methodology which states that should observed traffic flows vary by +/- 10% AADT compared to the forecast, a better than expected or worse than expected assumption can be made. The FYA traffic flows for the A3 show an increase of 23% above that forecast which indicates that there is a **worse than expected** impact on air quality along the new A3 alignment. Offline, Knockhundred Lane shows an increase of 31% which results in a **worse than expected** evaluation.
- 5.36. In contrast to this, the remainder of the roads where traffic data is available show **as expected** or **better than expected** results for air quality as traffic is either lower than forecast, or within the 10% margin.

**Table 5.4 - Summary of Effects on Air Quality**

Origin of Assessment	Summary of Effects on Air Quality	Assessment
AST	No AQMA currently exists for Hindhead. No air quality limit values will be exceeded in the opening year.  For most roads affected by changes in traffic there is likely to be an air quality improvement at residential properties. Only a few roads will experience deterioration in air quality. This deterioration is not considered significant.	Local Air Quality index  NO <sub>2</sub> = – 1079  PM <sub>10</sub> = -342
EST	Based on traffic flows along the old A3 and its connecting routes, it is likely that there has been an improvement in air quality in some areas, neutral in others and a significant worsening for two routes which includes the A3.	As expected or better than expected along offline routes except one location which is worse than expected.  Worse than expected along the new A3 and surrounding receptors.

## Greenhouse Gases

### Forecast

- 5.37. The AST and the ES stated that the scheme would increase emissions in the study area by 5.9% in 2009 (the opening year in earlier modelling) which was 7,000 tonnes CO<sub>2</sub> (calculated using the DMRB air quality assessment spreadsheet). Since the time of the appraisal, guidance now states that the impact should be expressed in terms of Carbon and this impact is 1,907 tonnes.

### Outturn

- 5.38. To facilitate a like for like comparison of forecast and outturn carbon impacts, an evaluation method consistent with that in the forecast is used. In the case of this scheme, no detailed

breakdown of the traffic data used to calculate the forecast figure above was available. To create a like-for-like, forecast figures for traffic and journey times have been used to create forecasts along the A3 improved by the scheme which can be compared with observed data for the same links. To capture the varying impact during the differing time periods, emissions have been calculated by time periods.

- 5.39. This shows that the scheme was forecast to increase carbon emissions on the A3 corridor and the outturn assessment has shown that there has been an increase by FYA. An increase of 5,300 tonnes (50%) was forecast and the scheme has delivered an increase of 7,600 tonnes (70%), which is 2,400 tonnes less than expected. The additional emissions arise from the large increase in traffic on the corridor and the increased speeds. Although the low speeds in the congested peak periods before the scheme was built meant that the traffic experienced inefficient fuel consumption, in general the higher speeds and extra traffic negate this beneficial effect in terms of carbon, hence the net worsening.
- 5.40. There are, however, some caveats regarding this evaluation. Modelling of the carbon emissions in the without-scheme scenarios for both forecast and observed don't fully reflect the emissions occurring in the very congested conditions on lengthy sections approaching to the crossroads in this scenario, especially stop-start traffic. Thus the net increase in the immediate area is likely to be overestimated.
- 5.41. Furthermore, this assessment does not cover the impacts over the wide area; some of the additional traffic on the A3 is a result of strategic traffic rerouting from longer routes which would have higher emissions, hence the scheme has reduced emissions from these trips, while any new trips on the A3 corridor will be increased emissions.

**Table 5.5 – Greenhouse gases (tonnes of carbon) impact on the A3**

Scenario	Forecast	Observed
Do Minimum	10,700	10,800
Do Something	16,000	18,400
<b>Change</b>	<b>5,300 (50%)</b>	<b>7,600 (70%)</b>

## Landscape

### Forecast

#### AST

- 5.42. The 2006 landscape AST stated that the large but relatively local adverse landscape effects within Tyndall's Wood and Boundless Copse had been considered in relation to the greater beneficial impacts upon the highly valued landscape with the Devil's Punch Bowl and Hindhead Common. It also noted that the balance of effect would be neutral in the opening year before landscape mitigation measures help to reduce impacts. However, the collective longer term landscape impact would be slightly beneficial due to the removal of the existing A3 from the Devil's Punch Bowl, the routing of traffic through the tunnel and the enclosure of the existing A3 corridor on the ridgeline north of Boundless Copse to Thursley.

### Non-Technical Summary of the Environmental Statement

- 5.43. The Non-technical summary stated that the majority of the scheme lay within a landscape designated at both national (AONB) and county (Area of Great Landscape Value - AGLV) levels for its exceptional scenic qualities. The dramatic local topography, heathland and pine woodland made the Devil's Punch Bowl and Hindhead Common a famous beauty spot. The local landscape also possessed strong cultural associations linked with the historical remoteness and wild nature of the heathland commons, which attracted late Victorian and Edwardian notable figures to the area and gave Hindhead a contemporary reputation for cultural and literary sophistication. The summary stated that the scheme would have a significant impact upon the local landscape, despite the provision of a tunnel, particularly in Tyndall's Wood and Boundless Valley where extensive vegetation removal and earthworks

would alter the attractive semi-natural character of these heavily wooded valleys. However, whilst locally significant, these landscape impacts would be effectively contained by surrounding woodland and the steep-sided nature of the valleys. Conversely, taking traffic under Hindhead Common and closing the existing A3 around the Devil's Punch Bowl would restore a sense of remoteness and tranquillity to this high quality landscape and valued beauty spot. The removal of traffic would also help to reconnect the fragmented heathland landscapes within the Devil's Punch Bowl and Hindhead Common, which was severed by the then existing busy A3.

- 5.44. The proposals included extensive earth mounding and grading of side slopes to screen views of traffic and fit the scheme into the landform. Planting of woodland, hedgerows and heathland would take place in the first available season. The initial landscape benefits of the scheme would just outweigh the adverse landscape effects within Tyndall's Wood and Boundless Valley. In time, the adverse impacts would reduce as planting becomes established, increasing the beneficial landscape impact.
- 5.45. It was predicted that in 2009 during construction, 97 properties would have an adverse visual impact, whilst 90 would have a beneficial visual impact. By 2024, 75 properties would have an adverse visual impact, with the degree of impact reduced in many cases, whilst 129 would have a beneficial visual impact. Some properties would be adversely affected by lighting, although local conditions would limit significant adverse impacts to only 6 properties. More footpaths would be adversely affected by views of the scheme than would benefit from the closure of the existing A3 through the Devil's Punch Bowl. However, the area of public open space from which views would benefit from the scheme would be greater than that from which views would be degraded and these benefits would also apply to the paths and viewpoints that are the most popular.

## Landscape Consultation

- 5.46. Grayshott Parish Council commented as follows:

- *“Councillors are of the opinion that protection of the environment is good, although they felt that the roundabouts at the Hazel Grove junction are very unkempt.”*

- 5.47. At OYA the National Trust stated that they felt that the landscape planting associated with the scheme and the re-instatement of the old A3 to heathland were worse than what was initially expected.

*It was “disappointed that the ‘topsoil’ used to cover the old A3 was not fit for purpose and that many tonnes of imported soil from outside the UK was shipped in to rectify the problem”. It was also “disappointed that there wasn’t more soil on the old A3 and understood that the perceived amounts of soil were not in fact available. This has led to less undulation in the back-fill than was anticipated and therefore the relatively rugged landscape connection between the Devil’s Punch Bowl and Hindhead Common has not been achieved”.*

- 5.48. The initial comment received from the National Trust has not been supported with evidence. This has been communicated to the National Trust representative. At the time of writing the FYA evaluation no further comments were received from the National Trust.

## Landscape Evaluation

### OYA Evaluation

- 5.49. The OYA evaluation found that the initial performance of planting was generally successful. Throughout the main works period failed plantings had been identified and replaced. Estimated failures amounted to about 4% principally within the first two years after planting.
- 5.50. It was noted that there was a large volume of pernicious weeds, Gorse and latterly Broom, present in the landscape plots. It was presumed that this was likely to be due to the latent seed bank present in the woodland soils and naturally occurring plants in areas adjacent to the planting plots. The OYA evaluation noted that there was a need to control these weeds to

ensure that they were not allowed to encroach onto the surrounding sensitive landscape. It was required that maintenance regimes should be assessed to determine whether sufficient controls were in place.

- 5.51. Overall, it was considered at OYA that impacts were as expected. It was noted that the landscape evaluation should consider whether the mitigation planting was maturing and reducing impacts as predicted at a later date. Heather seeded areas should be reassessed at a later date due to their slow overall establishment rates at OYA.
- 5.52. It was noted that the establishment of heather along the restored footprint of the Old A3 through the Devil's Punch Bowl had not been successful as yet. The original seeding strategy, which was agreed with the National Trust), was to use a nurse species, erosion matting in sensitive locations and heather brash (harvested from local National Trust sites). The vegetation monitoring undertaken as part of the Aftercare Scope had not found any evidence of heather establishment to date, although a general herb layer had established (where not affected by subsequent vehicle movements associated with the National Trust's vegetation clearance strategy on the Common). This was not unusual - trials and extensive research on similar sites by others had shown that heather establishment is very fickle – being heavily affected by the fertility of seeds in any one year, slow growth rates and extent of disturbance. The maintenance strategy should ensure that invasive weeds or aggressive species such as Gorse are kept under control during the Aftercare Period in an effort to aid colonisation / establishment. Success in the short-term was unlikely, but would happen over time.

## **FYA Evaluation**

- 5.53. The FYA evaluation of the landscape sub-objective relies on the most part on monitoring reports undertaken during the five year aftercare period. The first part of this section discusses the various maintenance handover areas and their evaluation based on the POPE site visit, followed by an evaluation of the old A3 corridor and then the results of the lichen survey are discussed. It should be noted that the latter two sub sections are taken from the monitoring reports received by POPE.

## **Handover Maintenance Assessment**

- 5.54. Confirmation of the handover of maintenance requirements by Highways England to various maintenance bodies has been received as follows:
- Initial control of Gorse was undertaken by the construction contractor within the requirements of their contract.
  - Phased handover of the landscape and planting areas to Highways England area maintenance teams had occurred in some areas earlier than planned
  - Side Roads including verges were handed over to the Surrey County Council in March 2012 although it appears that the Council was not in agreement with this. Surrey's maintenance requirements listed in the Handover Environmental Management Plan (HEMP) had not, at the time of writing, been handed to the Council.
  - Maintenance of areas affected by the scheme, or lack thereof, currently lies with the Highways England area maintenance team and Surrey County Council..

## **Site Visit Assessment**

- 5.55. A site visit was undertaken in August 2016. The outcome of this visit is linked to the handover status of the old A3 alignment, areas handed to Surrey County Council and sections of the route managed by the Highways England.

## **General Maintenance overview of the old A3 alignment**

### Devils Punch Bowl (National Trust)

- 5.56. Further to the summary of the restored A3 footprint through the Devil's Punch Bowl in the OYA report, these elements will not be repeated in the FYA report. At FYA it is noted that maintenance appears patchy if at all which as discussed below is leading to further deterioration of seeded areas.

- 5.57. Woodland edge and deciduous / mixed woodland planting (as shown in Figure 5.4 below) comprising Birch, Hazel, Holly, Prunus and Oak appears to show low growth results, possibly due to compacted, nutrient poor soils.

**Figure 5.4 - Planting plots within the old alignment**



- 5.58. Maintenance of National Trust planting plots near the northern portal of the scheme is good with plants showing reasonable growth although there is some evidence of grazing by deer. In comparison it is clear in the background to Figure 5.5 (see highlighted areas below) that the planting areas within the control of the managing agent contractor is not receiving maintenance to control gorse.

**Figure 5.5 - Maintenance of planting plots**



- 5.59. A view comparison is shown in Figure 5.6 based on viewpoint predictions in the ES. The first view shows the pre-scheme visibility of the old A3 through the Devils Punchbowl north-east of the National Trust café. The second view is the predicted visibility of the old A3 footprint by year 15 (design year). The actual view comparison taken in a similar location at FYA demonstrates the design changes that must have occurred during detail design consultation resulting in a change in the predicted landscape view.

**Figure 5.6 - The Devil's Punchbowl – view comparisons – before construction, illustrative view by year 15 and actual view at FYA (Summer)**



**The Devil's Punch Bowl:** Existing view north-east over the Devil's Punch Bowl from viewpoint north-east of the National Trust Cafe (Summer)



**The Devil's Punch Bowl:** Illustrative view north-east over the Devil's Punch Bowl from viewpoint north-east of the National Trust Cafe in the fifteenth year after the restoration of the Existing A3 (Year 15 - Summer)



## Side Roads and Verges (SCC)

- 5.60. Vegetation is establishing well in the region of the Hammer Lane minor underpass and planting plots appear well maintained as shown in Figure 5.7 below.

**Figure 5.7 - Hammer Lane minor underpass**



- 5.61. Gorse is establishing along the side road between Hammer Lane underpass and Hazel Grove junction.

**Figure 5.8 - Gorse establishing on footpaths**



- 5.62. The eastern side of the dumbbell roundabout at Hazel Grove junction has well established specimen trees within it, although gorse is also seen to be establishing within the open grassland areas and around the perimeter of the junction. The comment received from the Grayshott Parish Council notes this concern.

**Figure 5.9 - Hazel Grove junction**



### **A3 Mainline**

- 5.63. There appears to have been little invasive species control as a part of the routine vegetation maintenance undertaken by the managing agent contractor. In the comparison views between OYA and FYA it is quite clear that gorse and other aggressive plant species that formed part of the original seed bank and mentioned as requiring control in the future in the OYA report, have not been controlled. Based on their development, it would appear that control has not happened for at least three years.
- 5.64. Despite the competition from invasive plant species, woodland planting has progressed well in a few plots with other areas showing little growth, possibly due to poor soil conditions. Figure 5.10 and Figure 5.11 demonstrate this mixture of growth achievements.

**Figure 5.10 - Plant progress southbound near Hazel Grove junction (OYA view on the left, with FYA on the right)**



**Figure 5.11 - Northbound off slip at Hazel Grove junction (OYA view on the left, with the FYA view on the right)**



**Figure 5.12 - View from Miss James Bridge towards the south portals (OYA view first, with FYA below)**



**Figure 5.13 - Species rich for steep slopes mix on the slopes of the southern portal entrance to the tunnel (OYA view on the left, with the FYA on the right)**



- 5.65. Vegetation maintenance within the Canadian Memorial site appears good. It is noted that the hedging planted around the crest of the landscape mound has grown well, although the Maple trees planted in intervals along this crest appear to have not progressed since the OYA site visit as demonstrated in Figure 5.14 below.

**Figure 5.14 - Canadian Memorial site showing a Maple tree in the background (OYA view on the left, with the FYA view on the right)**



### Monitoring of vegetation establishment on the restored A3 corridor

- 5.66. As a part of the 5 year aftercare maintenance, monitoring<sup>26</sup> was commissioned by Highways England to assess the establishment of the heathland / grassland mosaic along the former A3 route which cuts through the Devil's Punch Bowl to assess whether the objectives were being met. A summary of these findings is provided below:
- The area was originally seeded in November 2011 using a local acid grassland seed mix, followed by spreading of heather 'brash' collected from Hindhead Common in January 2012. Subsequent additional hydro seeding of a 'nurse' seed mix using only the grass species occurred in October 2012 as well as further scattering of heather brash.
  - Detailed quadrat surveys were carried out in 2012 and 2015. Walkover surveys were completed in 2013 and 2014 with a final walkover survey in 2016.
  - All eleven species sown in the seed mix were found to be present during the 2016 survey. Just five of the eleven species were abundant or frequent, compared to eight in both 2014 and 2015. Moreover, the majority of species had very low ground cover values. This shows that establishment has been successful only in that the target species are still present, however, there has been a notable decline in the frequency and ground cover of these species.
  - It has been established through monitoring that the soil status of the sown area is mostly neutral rather than acidic and that the majority of the target species will thrive in neutral to moderately acidic soils. Therefore, the status of the soil is not responsible for the observed decline in target species.
  - Two key issues have repeatedly been highlighted throughout the monitoring programme as being problematical for the establishment of a grassy sward. The establishment of

<sup>26</sup> From the report – "Monitoring of vegetation establishment on the restored A3 corridor – 2016"

Gorse was noted in 2013 and subsequent surveys commented upon its continuing increase in extent, growth, height and ground cover. Its ability to outcompete the species-rich sward that was developing was highlighted as a problem.

**Figure 5.15 - Further Gorse Establishment**



- Additionally, high levels of disturbance, caused by trampling from heavy public use of the trace, and high levels of vehicle movement have been reported each year. Members of the public using the trace have commented on the year-on-year increase in the use of motorbikes, which has exacerbated the problems.
- The 2016 surveys have shown a marked increase in bare and disturbed ground along the trace. The late winter and spring of 2016 have been extremely wet and so the movement of vehicles has been far more damaging in these conditions, resulting in much vegetation being destroyed. The very dry summer has compounded this and prevented re-establishment.
- The Gorse is now over 1.5m high in places and forming dense thickets. Recent attempts to tackle Gorse along a small part of the northern end of the trace have failed, for regrowth is vigorous. The height of the Gorse blocks the view across the landscape along the northern half of the trace.

**Figure 5.16 - Gorse blocking views**



- A slight increase in heather establishment has been observed in the curve of the Devil's Punch Bowl, and growing on an undisturbed 'island' in the centre of the trace. Vigorous Gorse growth is outcompeting the heather in these areas.
- The remaining vegetation is restricted to a narrow margin between the Gorse front and the heavily disturbed ground along the centre of the trace. An observed decline in the extent and cover of the target species and grassland communities is inevitable.
- Recording the frequency of species in a disturbed environment has proved ineffective, for although many species are consistently present, they are at very low levels and in a state of flux. Species with a formerly high cover may be reduced to a single plant through competition or disturbance. The fluctuations in ground cover are not shown in presence or absence monitoring.
- The southern end of the trace with natural regeneration and the northern part of the trace with tree planting (notwithstanding the recent works) are suffering the same problems. However, Gorse establishment at the southern end of the trace is restricted, partly due to waterlogging.
- Native woody species such as Bramble, birches and willows continue to increase in frequency and non-native invasive species such as Laurel and Rhododendron are still present.
- The parasitic Dodder *Cuscuta epithymum*, found during the 2013 and 2014 surveys, was not seen in 2015 or 2016. This species tends to be parasitic on very young Gorse, just past the seedling stage, and may have disappeared as the shrub has matured.
- The presence of the non-native, invasive and difficult to eradicate Japanese Knotweed was reported in 2014 and 2015, and was recorded again in 2016. Continued control of this plant should be implemented.
- A former patch of Japanese Knotweed was not seen during this survey and may have been hidden by the dense Gorse. It is also possible that control of this patch has been successful. However, continued monitoring for the presence of this species and treatment if found is recommended.
- The monitoring programme has shown that the attempt to restore a mosaic of heathland vegetation and acid grassland has not been successful. The species assemblages and the communities present show that this is most likely attributable to the pH status of the soil.

**Figure 5.17 - Heathland vegetation yet to establish**



- Overall, the 2016 survey has recorded a marked deterioration in the quality of the habitat. Establishment of grassland and/or heathland requires a lack of disturbance, as well as on-going management in the form of cutting or grazing in order to prevent the establishment of and competition from woody species. Neither of these has been achieved.

5.67. The viewpoint comparison shown in Figure 5.6 of the Devil’s Punchbowl from the northeast near the National Trust Café is quite different to the one predicted in the ES. The old A3 trace is quite clearly shown as a scar on the landscape. With the lack of establishment of vegetation along the trace and platform left after construction, it is doubtful whether the predicted view will be achieved at year 15.

**Visual Impacts**

5.68. Based on woodland planting growth at five years after scheme opening, some softening of effect has been experienced. It is expected, that should planting growth continue and a programme of control of invasive species be implemented, visual screening will occur as expected in by the design year (15 years after scheme opening). By the design year, it is expected that filtered views of the scheme in some locations will remain, with the scheme more visible in the winter due to deciduous tree species losing their leaves.

**Table 5.6 - Summary of Effects on Landscape and Visual Evaluation**

Origin of Assessment	Summary of Effects on Landscape and Visual Evaluation	Assessment
AST	The large but relatively local adverse landscape effects within Tyndall’s Wood and Boundless Copse have to be considered in relation to the greater beneficial impacts upon the high quality and very highly valued landscape within the Devil’s Punch Bowl and Hindhead Common. Whilst the balance would be fine in the opening year before landscape mitigation measures help to reduce impacts, the collective longer-term landscape impact would be slightly beneficial due to the removal of the Existing A3 from the Devil’s Punch Bowl, the routing of traffic through the tunnel and the enclosure of the Existing A3 corridor on the ridgeline north of Boundless Copse to Thursley.	Slight Beneficial
EST	Planting in the Devil’s Punch Bowl is not at the growth level or species diversity and colonisation expected at FYA. Planting along the old alignment between Hazel Grove Junction and Hammer Lane minor underpass has progressed well, although gorse is threatening this growth in some areas. Woodland planting along the new A3 alignment is showing good growth in most areas. However, gorse is colonising large areas of the soft estate and appears to be unmanaged. Overall, maintenance is the largest risk to the success of the landscape planting with all areas being threatened by gorse.	Worse than Expected

## Townscape

### Forecast

- 5.69. The 2006 townscape AST stated that the removal of through traffic from the closed section of London Road to the north of the Hindhead Crossroads would significantly improve the quality of the local townscape and would outweigh minor impacts on Crossways Road and Tower Road associated with the potential implementation of local traffic calming measures. Overall, the townscape impact would be moderate beneficial, although any benefits would be large beneficial should streetscape improvement be implemented along the closed section of London Road following the completion of the main scheme.
- 5.70. The ES Non-Technical Summary stated “On balance, there would be less traffic on roads past residential properties, which would benefit the local townscape, particularly in Hindhead centre where a more pleasant and versatile environment can be created.”
- 5.71. The operational townscape impacts are described and assessed for each character area directly or indirectly affected by the scheme. The three areas include:
- Hindhead Centre
  - Hindhead Crossroads
  - Grayshott

## Evaluation

### OYA Evaluation

- 5.72. The OYA evaluation concluded that traffic volumes in some locations appeared to have had a greater bearing on residents’ perception of the effects of the scheme on the local townscape. The assessment undertaken within the ES appears to recognise this impact, although the varying results for traffic volumes has both negatively and positively influenced this to some extent.

### FYA Evaluation

- 5.73. No further evaluation has been undertaken at the FYA stage as no significant change has been noted.

Origin of Assessment	Summary of Effects on Townscape	Assessment
AST	The removal of through traffic from the closed section of London Road to the north of the Hindhead Crossroads would significantly improve the quality of the local townscape and would outweigh minor impacts on Crossways Road and Tower Road associated with the potential implementation of local traffic calming measures. Overall, the townscape impact would be moderate beneficial, although any benefits would be large beneficial should streetscape improvements be implemented along the closed section of London Road following the completion of the main scheme.	Moderate Beneficial
EST	Traffic volumes at Grayshott and Hindhead have generally reduced significantly, reducing the adverse impact of peak hour traffic volumes.	As Expected

## Cultural Heritage and Archaeology

### Forecast

#### AST

- 5.74. The 2006 AST predicted that there would be no impacts on designated sites, although there would be impacts on small proportions of locally and regionally important archaeology and

historic elements of the landscape. Further to this there would be some risk to unknown/undiscovered archaeology. There was predicted to be a neutral or moderate beneficial effect on the settings of listed buildings and structures and the area of the Devil's Punch Bowl, because of the removal of the A3 and reduced traffic intrusion. The overall score for Heritage was **slight adverse**.

### Non-Technical Summary for the Environmental Statement

5.75. The non-technical summary stated that an archaeological and cultural heritage study had revealed a range of sites of archaeological and historical interest. However, the overall archaeological potential for the route was forecast to be low. There were eleven Listed Buildings and structures close to the route. The scheme would have a moderate or slight adverse effect on some of the surviving elements of this historic landscape, including parts of the boundary bank to Hindhead Common in Boundless Valley. There would be a positive effect on the visual setting of parts of the built heritage.

### Environmental Statement

5.76. The ES stated that the scheme would have a range of effects, both adverse and beneficial, on the heritage resource. The main adverse effects, resulting largely from the operational impacts of the Published Scheme, would be on features of post-medieval and modern date, although some of these may have their origins in the medieval period.

5.77. It would have minor adverse effects on:

- The possible strip lynchets<sup>27</sup> on Nutcombe Down and Tyndall's Wood.
- The hollow-ways northeast of Hazel Grove and north east of Hammer Lane.
- Bank and ditch features on Nutcombe Down.
- Features suggested by the Kiln Field field-name near Bedford Farm.
- Old Portsmouth Road.
- The peat deposits in Boundless Copse.
- Any surviving post-medieval elements within the Spaniard Inn.

5.78. There would be minimal effects on the built heritage, although the diversion of much of the through traffic away from Hindhead would have a positive impact on the visual setting of the built heritage, resulting in a minor beneficial effect on the Grade II listed Undershaw Hotel.

5.79. The scheme would have a moderate adverse effect on boundary banks and ditches of the field system around Boundless Copse and the surrounding historic landscape, and a minor adverse effect on the historic landscape around the southern section. These impacts would be balanced, in part, by the moderate beneficial effect on the historic landscape of the Devil's Punch Bowl, an area proposed as one of Special Historic Landscape Value in the Waverley Borough Council Local Plan.

5.80. In overall terms, it was expected that the scheme would have a **minor adverse** effect on Cultural Heritage.

### Consultation

5.81. No response was requested from English Heritage as this topic has been scoped out of the FYA evaluation.

5.82. Grayshott Parish Council commented that the features that have been regained and retained are very good. In relation to the Devils Punch Bowl this has provided very good open land for recreation and Miss James' Bridge enables walkers to traverse the A3 easily and safely.

### Evaluation

#### OYA Evaluation

5.83. The OYA evaluation noted that the investigation of the A3 London–Portsmouth road at Hindhead, Surrey revealed evidence for prehistoric settlement and post-medieval industry

---

<sup>27</sup> Banks of earth which are feature of ancient field systems.

and land use. The works comprised documentary research, geophysical survey, earthwork survey, geo-archaeological auger survey, trench evaluation, excavation, and watching brief.

- 5.84. A programme of archaeological works, undertaken in advance of improvements to the A3, saw the investigation of 21 mitigation sites along the proposed 6.7km route between Bramshott Common and Thursley<sup>28</sup>. Although archaeological remains were relatively sparse along much of the route, a number of discoveries were made which added significantly to the known archaeology of this part of Surrey. These included residual Neolithic finds, and the discovery of a small Middle/Late Bronze Age settlement towards the northern end of the route. The examination of a widespread peat deposit, previously thought to be of a Bronze Age date, showed it to have formed in the Early–Middle Saxon period. Field boundaries and land use divisions of probable post-medieval date were examined at various points along the route, and a number of lime kilns, shown to date from the early 17th to early 18th centuries, were excavated.
- 5.85. The archive, which includes copies of the unpublished Wessex Archaeology reports listed in the bibliography, had been deposited at the Museum of Farnham under accession no. WAVMS AO13.11.
- 5.86. The ES lists a number of listed buildings that had the potential to be impacted upon as a result of the scheme. Their impact was determined as neutral or moderate beneficial. This was confirmed during the site visit.

#### FYA evaluation

- 5.87. Based on the findings during the OYA evaluation, no further consideration has been given to Cultural Heritage at the FYA stage.

Origin of Assessment	Summary of Effects on Cultural Heritage and Archaeology	Assessment
AST	No impacts on designated sites. Impact on small proportions of locally and regionally important archaeology and historic elements of the landscape. Some risk to unknown/undiscovered archaeology.	Slight Adverse
EST	No further assessment undertaken, assumed to be as expected.	As Expected

## Biodiversity

### Forecast

#### AST

- 5.88. The 2006 AST stated that there would be a small adverse direct impact on the adjacent Wealden Heath SPA/Devil's Punch Bowl SSSI through construction activities. There would be very small adverse impacts on international / national nature conservation interest due to increased passing traffic. The AST further stated that there would be a direct adverse impact on areas of non-designated woodland and woodlands east of Hindhead SNCI<sup>29</sup>. There would be a large beneficial impact on Wealden Heaths SPA / Devil's Punch Bowl SSSI due to the removal the existing A3 road and restoring carriageway to heathland. The overall score for biodiversity was **moderate beneficial**.

#### Non-Technical Summary for the Environmental Statement

- 5.89. Construction of the scheme would cause loss of woodland and hedgerow habitats in several locations. The northern section of new road would pass through the Woodlands East of

<sup>28</sup> Late prehistoric settlement and post-medieval industrial activity on the route of the A3 Hindhead Improvement Scheme – Draft Publication for Surrey Archaeology Collections.

<sup>29</sup> Site of Nature Conservation Interest

Hindhead Site of Nature Conservation Importance (SNCI), with removal of substantial areas of plantation woodland. There would also be substantial woodland clearance in Tyndall's Wood and Nutcombe Down.

- 5.90. The former route of A3 passed through the Devil's Punch Bowl SSSI, part of the internationally important Wealden Heaths SPA. The closure of the existing A3 across the SSSI and its restoration to heathland would eliminate existing severance, remove pollution from road run-off and vehicle emissions and reduce noise levels. This would provide major benefits for the SSSI and a range of associated species including reptiles, badgers and rare heathland birds.
- 5.91. Key features of the scheme for biodiversity would include: restoration of heathland along the existing A3 through the Devil's Punch Bowl; creation of areas of new woodland, heathland, grassland and wetland in Boundless Copse and Tyndall's Wood; and the translocation of protected species at risk prior to construction. Also provided would be badger underpasses, rope 'bridges' for dormice and bat boxes. The Exchange Land areas (Highcombe Edge, Spaniard's Inn, Canadian Memorial and Chase House Link) would be managed to enhance biodiversity by restoring heathland and broadleaved woodland. No ecological monitoring was specified as being required for the Exchange Land areas in the ES and therefore the success or otherwise of any biodiversity enhancements for these areas cannot be evaluated by POPE.
- 5.92. These measures, combined with the benefits of removing the existing A3 over Hindhead Common, would, on balance, provide significant benefits for a variety of wildlife and would enhance the conservation status of the SSSI and SPA.

### Environmental Statement

- 5.93. The ES stated that over the whole scheme, the negative impacts would arise primarily through the loss of habitat in Boundless Copse and Tyndall's Wood, and the subsequent impacts on species of conservation importance, both through direct habitat loss and through disturbance and mortality arising from the operation of the new A3 carriageway.
- 5.94. The ES expected that this would be balanced by the major improvements to environmental conditions on the Devil's Punch Bowl SSSI component of the Wealden Heaths SPA, an internationally important site for nature conservation.
- 5.95. In the ES a series of mitigation measures were stated that would be undertaken for both specific habitats and species. Please refer to the OYA report for details on this mitigation.

### Consultation

- 5.96. At the time of writing this evaluation no comments were received from consultees regarding biodiversity impacts.

### Evaluation

#### OYA Evaluation

- 5.97. The OYA evaluation contained detailed information that will not be repeated in this report. In summary, new habitats of woodland, scrub, hedgerow, wet flush and species-rich grassland were created as part of the landscaping works as expected. Mitigation for dormice had been implemented as expected and it was indicated that this would result in a positive effect on the species. Acid grassland seeding on the old A3 had been moderately successful, however heather seeding of the old A3 had yet to show any signs of growth and therefore it was considered too early to determine whether the heathland restoration of the old A3 has been successful.

#### FYA evaluation

- 5.98. Species rich grassland and woodland planting within the new A3 alignment is showing mixed success based mostly on a lack of required maintenance. Although gorse and bramble

provide habitat in themselves, their lack of control is impacting on the overall diversity of mixed habitats intended for the scheme due to its ability to outcompete the developing species-rich sward.

- 5.99. Extracts of monitoring reports received for the scheme have been used below to demonstrate results and actions required.

#### Vegetation survey along old A3 alignment

- 5.100. Overall, surveys have recorded deterioration in the quality of the habitat over time, mainly due to soil pH, trampling and establishment of Gorse. Establishment of grassland and/or heathland requires a lack of disturbance and on-going management in the form of cutting or grazing in order to prevent the establishment of woody species. Neither of these has been achieved, and it is unlikely that the situation will improve unless public access can be restricted to allow the grassland / heathland vegetation to establish, and unless management of Gorse is implemented.

#### Invertebrate Monitoring at Boundless Copse<sup>30</sup>

- 5.101. Monitoring concentrated upon flies (Diptera) and beetles (Coleoptera), Trapping was carried out for two, two-week durations and all traps remained in the same locations as those used in both 2007 and 2009 surveys.

- It was found that the species richness and abundance of beetles had continued to decrease from 2009 to 2014, following the trend seen from 2005 to 2009.
- The changes observed in flies were more varied with species richness of both wetland community and humid woodland community flies falling from 2005 to 2007, rising slightly from 2007 to 2009 but then decreasing during the monitoring in 2014 to the lowest levels observed.
- The overall community rarity also continued to decrease for wetland flies, and showed an overall decrease in humid woodland flies. Although it was considered possible the variation in results were due to prevalent weather conditions, it was considered the overall decline throughout the monitoring period was likely due to the nearby work causing changes in resource availability and habitat through likely reduced dead wood resource and change of microclimate within and around Boundless Copse. Therefore, it is recommended that works should be undertaken to improve habitat for such species.

#### Dormouse monitoring<sup>31</sup>

- 5.102. Evaluation of data over the duration of the scheme between 2002 and 2015 for each woodland surveyed would appear to suggest that the total number of Dormice recorded, the total number of boxes occupied by Dormice and the average number of Dormice recorded per box between 2002 and 2015 has not varied significantly and that the population of Dormice is healthy and remains relatively stable.

- 5.103. Therefore, it is considered that the mitigation measures implemented for the scheme have been successful and that the A3 Hindhead scheme has had no negative impacts on the population of Dormice within the woodland surveyed.

#### Breeding Bird monitoring<sup>32</sup>

- 5.104. Surveys for the three SPA species were concentrated within The Devil's Punch Bowl SSSI, including Hindhead Common and Highcombe Edge. The generic breeding bird survey area included woodland, scrub and heathland around Hindhead and comprised Boundless Copse, Blackhanger and Tyndall's Wood.

---

<sup>30</sup> From the report - Invertebrate Monitoring, 2014 at Boundless Copse

<sup>31</sup> From the report - Dormouse monitoring report 2015

<sup>32</sup> From the report – Breeding Bird Monitoring 2015

- 5.105. Overall, of the 58 species recorded breeding at Hindhead between 2003 and 2015, 29 have shown population increases between 2003 and 2015 and 19 have shown a decline.
- 5.106. Analysis of the distribution of territories for the three SPA species, five heathland species of conservation concern and five habitat generalist species, suggests that since the closure of the old A3, territory numbers have shown increases within the 250m corridor of the closed A3. The preliminary analysis in 2012 indicated that territories are distributed closer to the closed A3 with later surveys confirming this.
- 5.107. Therefore, it is considered that the closure of the old A3 and an abundance of breeding habitat are the main contributory factors benefitting the number and distribution of the majority of species across the survey area and, in particular, within the 250m corridor of the closed A3.

#### Reptile monitoring<sup>33</sup>

- 5.108. Reptile surveys carried out in areas of habitat intended to provide reptile habitat under the Landscape & Ecology Management Plan for the A3 Hindhead Scheme confirmed presence of Slow-worm and Grass Snake in Tyndall's Wood and Slow-worm, Common Lizard and Grass Snake in Boundless Copse.
- 5.109. Numbers of Slow-worm and Grass Snake recorded in Tyndall's Wood in 2016 were at the same level as maximum counts recorded in 2002/2003, suggesting that populations of these two species remain at a similar level post-construction.
- 5.110. Adders were not recorded in Tyndall's Wood in 2016. Adders may still be present in areas of habitat outside the Scheme footprint in Tyndall's Wood but colonisation of new habitat has not yet occurred. Adders were not recorded in Boundless Copse, suggesting that this species is absent from the surveyed areas and has not recolonised from populations outside the scheme boundary.
- 5.111. Numbers of Grass Snake, Common Lizard and Slow-worm were lower in Boundless Copse than recorded prior to construction. No reptiles were recorded west of the Scheme. This may be due to the requirement for reptiles to colonise this area by dispersing from habitat east of the Scheme and around the north tunnel portal.
- 5.112. The presence of juvenile Slow-worm, Common Lizard and a sub-adult Grass Snake in Boundless Copse demonstrates that successful breeding of all three species is still occurring. The habitats created are suitable for reptiles and it is therefore considered that reptile populations have the potential to increase in the future.

#### Lichen survey results<sup>34</sup>

- 5.113. In addition to the vegetation survey undertaken, a survey of lichen species was commissioned by Highways England with the results shown below:
- In much of South-eastern England, the atmosphere has become more alkaline due to intensive agriculture and exhaust emissions from cars. In spite of the closeness of the new A3 route above the Devil's Punch Bowl, the lichens here do not indicate an unhealthily alkaline atmosphere.
  - The situation in the survey area is complex. Comparing lichens present during four separate surveys, it is clear that the lichen flora in two of the southern areas has deteriorated though was rallying in some respects in 2013. It is possible that the deterioration was the result of accumulations of neutral to acid dust on the trees resulting from the road construction.

---

<sup>33</sup> From the report – Reptile Monitoring Report 2016

<sup>34</sup> Final ecological summary report – January 2017

- The lichens recorded in the north suggest an atmosphere that is neutral, or perhaps slightly acid. Many species that are becoming scarce in other parts of the country due to an increasingly alkaline atmosphere are still present and healthy here.
- The most major problem causing decline in lichens in the study areas is the lack of light below the canopy. If the locally important lichens of the study area are to be maintained, thinning the woodland would be required, and the increase in shrub layer species such as Holly should be reversed.

### Planting failure

- 5.114. The green bridge effect for Miss James' footbridge has lost most of the initial planting of heather and shrubs at FYA which will affect its intended use by various fauna including deer. Figure 5.18 shows the OYA / FYA comparison.

**Figure 5.18 - Miss James Footbridge facing east (OYA view on the left, with the FYA view on the right)**



**Figure 5.19 - Dormouse bridge near Miss James overbridge (OYA view on the left, with the FYA view on the right taken from the opposite side of the dormouse bridge)**



- 5.115. The one way mammal gate in the perimeter fence for Pond H appears to not be receiving any maintenance as shown in Figure 5.20.

**Figure 5.20 - One-way mammal gate (OYA view on the left, with the FYA view on the right)**



**Table 5.7 - Summary of Effects on Biodiversity**

Origin of Assessment	Summary of Effects on Biodiversity	Assessment
AST	Small adverse direct impact on adjacent Wealden Heath SPA/Devil's Punch Bowl SSSI through construction activities. Very small adverse impacts on international / national nature conservation interest due to increased passing traffic. Direct adverse impact on areas of non-designated woodland and Woodlands East of Hindhead SNCI. Large beneficial impact on Wealden Heaths SPA / Devil's Punch Bowl SSSI due to removing the existing A3 road and restoring carriageway to heathland.	Moderate Beneficial
EST	New habitats of woodland, scrub, hedgerow, and heather, wet flush and species-rich grassland have been created as part of the landscaping works as expected. Overall, there is a mixed success on species monitored as a part of the aftercare programme with positive effects on dormice and breeding birds and negative effect on invertebrates and reptiles. Overall, planting is considerably worse than expected along the old A3 and new A3 alignment impacting on habitat as a whole.	Worse than expected

## Water Quality and Drainage

### Forecast

#### AST

5.116. The 2006 AST stated that the road and tunnel would be constructed above groundwater level and therefore would have an insignificant impact on groundwater movement, springs or public and private abstractions. Road runoff would be collected in a positive drainage system, and appropriate methods of treatment provided prior to discharge to either streams or groundwater. This would improve the existing situation where road run off was discharged without treatment, and would remove polluting discharges to the ecologically sensitive Devil's Punch Bowl. The overall impact was assessed as **moderate beneficial**.

5.117. The development (both tunnel and carriageway) will be constructed on and within the Hythe Beds, which are classed as a major aquifer by the Environment Agency. Protective measures

applied to major aquifers are set out within the Environment Agency's 'Policy and Practice for the Protection of Groundwater' and must be taken into account during the environmental assessment, design and construction of the scheme.

### Non-Technical Summary of the Environmental Statement

- 5.118. The scheme would cross a major aquifer which supplies two public water supply boreholes in Hindhead and numerous springs around Gibbet Hill and in the Devil's Punch Bowl. Some springs provide water to private households and farms. The tunnel would be aligned and constructed to avoid adverse effects on the water table. Small streams with sources around Gibbet Hill and in the Devils Punch Bowl would not be directly affected by the scheme.
- 5.119. Drainage of the new road would be designed to meet national standards set by the Environment Agency and would also remove polluting discharges from the existing A3. Run-off from the new road would be treated where it was discharged to streams or to infiltration ponds. In areas with limited land availability the road would drain to soakaways. These mitigation measures would ensure the scheme would provide a **moderate benefit** to the water environment.

### Consultation

- 5.120. No responses received at FYA for water quality and drainage.

### Evaluation

#### OYA Evaluation

- 5.121. The OYA report stated that mitigation measures had been implemented as expected and that no information had been provided to POPE that would indicate that it was performing other than as intended.

#### FYA Evaluation

- 5.122. No additional information has been submitted to POPE for this assessment on the water quality and drainage of the scheme.
- 5.123. All scheme pond sites were visited and appear to **not** have received regular maintenance since the OYA site visit. This is demonstrated in Figure 5.21 and Figure 5.22 with OYA views included for context to demonstrate the encroachment of gorse and other invasive species which is likely to be compromising their primary drainage function. Based on this, it is clear that there is a **worse than expected** impact on the scheme for Water Quality and Drainage
- 5.124. It is noted in the Landscape and Ecological Management Plan (June 2012) that the establishment maintenance period for vegetation is generally one year for grassland / wildflower plots and three years for planting, subject to satisfactory performance. Thereafter they will be maintained and managed as established plots in accordance with the DMRB Series 3000 Landscape and Ecology Specification. Based on this, it is assumed that there has been a failure to undertake the necessary maintenance to ensure the successful establishment of intended plant species within all pond locations.

**Figure 5.21 - Pond I showing establishment of reed beds at OYA and complete overgrowth at FYA (OYA view on the first, with FYA below)**



**Figure 5.22 - Pond I had not been completed at the time of the OYA site visit and the subject of excess soil storage at FYA (OYA view on the left, with the FYA view on the right)**



**Figure 5.23 - Pond H showing successful establishment of species-rich sward at OYA on the left, however at FYA on the right overgrown**



**Table 5.8 - Summary of Effects on Water**

Origin of Assessment	Summary of Effects on Water	Assessment
AST	Road and tunnel would be constructed above groundwater level and therefore would have insignificant impact on groundwater movement, springs or public and private abstractions. Road runoff would be collected in a positive drainage system, and appropriate methods of treatment provided prior to discharge to either streams or groundwater. This would improve the existing situation where road run off is discharged without treatment, and would remove polluting discharges to ecologically sensitive Devil’s Punch Bowl.	Moderate Beneficial
EST	No information has been received by POPE on the functional elements of water quality and drainage. However, the apparent lack of maintenance within pond sites does bring in to question whether these elements of the scheme are working as intended.	Worse than expected

## Physical Fitness

### Forecast

#### AST

5.125. The 2006 AST stated that there were relatively few pedestrians crossing the existing A3 in Hindhead (less than 200 a day). Reduced traffic severance in Hindhead resulting from the published scheme may encourage more pedestrians and cyclist trips. The provision of a dedicated cycle route and a tunnel, which would reunite severed sections of Hindhead Common, would be likely to encourage greater recreational use. The overall impact was assessed as **moderate beneficial**.

#### Environmental Statement

5.126. The ES confirmed that the scheme would include measures which would have the effect of mitigating the impacts of the scheme on public access and recreation. These aspects would

include the road tunnel, closure of the existing A3, grade separated crossings, diversions or creation of rights of way and provision of Exchange Land<sup>35</sup>.

5.127. The ES concluded that:

- The scheme would have a beneficial effect on the Devil's Punch Bowl and Hindhead Common, as the tunnel would remove the severance caused by the A3 to the open space and rights of way.
- Some public open space in Tyndall's Wood and Hindhead Common would be lost to the scheme and that there would be severance to footpaths.
- There would be improved pedestrian crossing points along the length of the scheme, notably as a result of underpasses at Hammer Lane, High Pitfold, Boundless Road and by the Greensand Way together with the safe crossing at Chase House link.
- There would be improved pedestrian, equestrian and cycle links, notably beside Bramshott Chase along the Boundless Road to Thursley link.

5.128. The ES stated that, following construction of the tunnel, the removal of the effects of the existing A3 and the provision of an alternative recreation route would enormously improve the experience of walking, cycling and horse riding both in terms of direct access, improved safety and restoration of tranquillity for both the Devil's Punch Bowl and Hindhead Common. Therefore, on balance, the scheme would have a beneficial impact upon public open space and rights of way. The overall effects of the scheme would greatly improve access facilities for pedestrians, horse riders and cyclists and other recreational groups, to enhance their amenity, and to make their movement safer through physical separation from motor vehicles.

## Consultation

5.129. No response to consultation was received.

## Evaluation

### OYA Evaluation

- 5.130. The OYA report stated that the Portsmouth Road (south), i.e. old A3 south of Hazel Grove, was reduced in width as a measure to reduce vehicle speeds as the road was downgraded from Trunk Road to a local access distributor road. The design was agreed with Surrey County Council, the highway authority for this road. The completed road was subject to a Road Safety Audit Stage 3 attended by Surrey County Council and the Police. All actions raised in the audit were implemented / closed out. Road design standards do not require central road markings on a road of this width.
- 5.131. The aims of the scheme, of particular relevance to NMUs, was to overcome the problems associated with the old A3 which included high traffic volumes and localised air pollution. The provision of an off line dual carriageway section enabled the old A3 corridor to revert to local use. This resulted in a general level of improvement to the environment for NMUs over the complete length of the corridor of the old A3 single carriageway section and of most of the local roads affected by the scheme.
- 5.132. The scheme benefits NMUs who used the old A3 or who were deterred from making trips along or across the old A3 corridor, mainly for utility trips (i.e. those made for commuting, shopping or educational purposes) in the vicinity of Hindhead crossroads and to the south west of the junction. These journeys were mostly by motorised transport with little to no increase in pedestrians and cyclists.
- 5.133. In terms of recreational use the scheme had resulted in changes to numerous sections of Public Rights of Way (PROW) affecting use of the area by NMUs. The scheme, being offline from the old A3 alignment, had resulted in the severance of existing PROWs in many cases.

---

<sup>35</sup> ES 3.5.1 states that the exchange land to be provided as part of the scheme should be 'no less in area' and 'equally advantageous to any persons entitled to rights of common or to other rights, and to the public'

This created a need for additional sections of PROW to provide continuity and to link in to suitable crossing points of the new carriageway, for example in the vicinity of Miss James Walk bridge.

- 5.134. During the OYA site visit, footpaths, cycleways and bridleways were assessed and found to generally be well maintained although no active signs of use were recorded. Pegasus crossings were in place as required on local roads.
- 5.135. Provision had been made for new and replacement footpaths and links, particularly within Boundless Copse and Tyndall's Wood, to enable continued public access. The scheme also provided areas of Exchange Land<sup>36</sup> of landscape value adjacent to Bramshott Common and more significantly adjacent to the Devil's Punch Bowl at Highcombe Edge and also improved links between Tyndall's Wood and Hindhead Common via a new at-grade crossing across the A287 Hindhead Road (the Chase House Link). In addition, underpasses were provided to the south-west of the Main Scheme (Canadian Memorial Underpass) on Bramshott Common, in the High Pitfold area and to the north of the Main Scheme (Greensand Way Underpass).
- 5.136. The OYA evaluation concluded that the overall scheme impact on Physical Fitness, was **as expected**.

#### FYA Evaluation

- 5.137. During the FYA site visit it was noted that there was good usage of all PROWs accessed. Cyclists were seen to be using the BOAT 500 and the bridleway access underbridge from High Pitfold. The Devil's Punch Bowl area was very well used by walking groups and dog walkers. It has been noted, however that there is continued use of the old A3 trace by motorbike enthusiasts which is impacting upon the vegetation growth along the trace. Overall it is concluded that the scheme impact on physical fitness is **as expected**.

**Figure 5.24 - Entrance to the northern start of the public right of way known as BOAT 500**



---

<sup>36</sup> Exchange land counterbalances land lost to the scheme. The exchange land to be provided as part of the Published Scheme should be 'no less in area' and 'equally advantageous to any persons entitled to rights of common or to other rights, and to the public'.

**Figure 5.25 - Public right of way through the Devil’s Punch Bowl following the alignment of the old A3**



**Figure 5.26 - Bridleway underpass access to High Pitfold from Portsmouth Road. (OYA view on the left, with the FYA view on the right)**



**Table 5.9 - Summary of Effects on Physical Fitness**

Origin of Assessment	Summary of Effects on Physical Fitness	Assessment
AST	Relatively few pedestrians crossed the old A3 in Hindhead (less than 200a day). Reduced traffic severance in Hindhead resulting from the Published Scheme may encourage more pedestrian and cyclist trips. The provision of dedicated cycle routes and a tunnel which will reunite severed sections of Hindhead Common are likely to encourage greater recreational use.	Moderate Beneficial
EST	The scheme has resulted in a positive impact on most PROW. There is greater use of main pathways through the Devil’s Punch Bowl.	Moderate Beneficial As expected

## Journey Ambience

- 5.138. The journey ambience sub-objective considers traveller care (facilities and information), traveller views and traveller stress (frustration, fear of potential collisions and route uncertainty).

### Forecast

#### AST

- 5.139. The 2006 AST stated that there would be a **large beneficial** effect on driver stress, except for drivers in the tunnel. There would be a large adverse effect on views from the road and slight beneficial effect with respect to traveller care (facilities) arising from the new dedicated footway/cycleway on sections of the existing A3.

### Non-Technical Summary of the Environmental Statement

- 5.140. The new dual carriageway with clear signing would provide safer journeys with significantly less delay and disruption. Travellers would enjoy a considerably enhanced service and experience less stress than they do at the moment. The lighting, signing and information services within the tunnel would aid and inform tunnel users.
- 5.141. The extent and nature of views from the new road would be significantly different from those along the existing A3, which is generally enclosed by woodland or development. The current fleeting, partial views across the Devil's Punch Bowl would be lost to A3 travellers. The tunnel would be a distinctive feature of the route. Fences or earth mounds to reduce noise would largely contain views out, except for some oblique forward views as the road travels through Boundless Valley. In time, the planting proposals would recreate the largely wooded character along the route.

### Environmental Statement

- 5.142. In addition to text from the non-technical summary of the environment statement, the following is relevant from the environment statement itself:
- The loss of views across the Devil's Punch Bowl following the closure of the Existing A3 and diversion of all traffic through the tunnel under Hindhead Common would represent a significant disadvantage for vehicle travellers. No views would be available within the tunnel section of the scheme, whilst roadside bunding to ameliorate noise impacts would prevent alternative long distance and attractive views eastwards over the Low Weald from the main scheme within Boundless Copse.
  - Driver stress levels throughout the scheme as a whole would be reduced from High levels at present to Low due to the high standard dual carriageway except that stress levels for drivers in the tunnel are assessed as Moderate.

### Consultation

- 5.143. No response received at the time of submission.

### Evaluation

- 5.144. Figure 5.10 summarises the evaluation of the various elements of journey ambience and the scheme's impact on this sub-objective. Overall the scheme impact is considered to be **slight beneficial** as expected.

**Table 5.10 - Summary of journey ambience evaluation**

<b>Traveller Factor</b>	<b>Score</b>	<b>OYA evaluation</b>	<b>FYA evaluation</b>
Views	Large Adverse	Views on the old A3 have remained south of the scheme as expected. Loss of views across the Devil's Punch Bowl through closure of the old A3 and diversion to the new road, loss of views of Hindhead Common due to diversion through the tunnel and the addition of roadside bunding reduce the views once enjoyed along the old A3.	No changes noted at FYA
Driver Stress	Moderate Beneficial	There is an improvement in journey times on the A3 which will have reduced congestion and hence frustration for the large number of drivers on the A3, although journey times on minor roads and the A286 have not shown journey time savings as a result of the scheme. Although there has been a significant reduction in collisions since scheme opening it has not contributed to the reduction in driver stress as motorists are nervous about collisions within the tunnel. Variable Message signs have been included as a part of the scheme which assists in reducing driver uncertainty.	In addition to comments made at OYA it is noted that collisions have reduced as was expected, but to a slightly less extent than predicted.
Care	Slight Beneficial	The A3 route has numerous lay-bys before and after the scheme. No new lay-bys are included within the scheme. Offsite care facilities are available along the route. Slight Beneficial assessment based on new dedicated footway/cycleway on sections of the old A3.	No further comments at FYA
<b>Summary Score</b>	<b>Slight Beneficial</b>	<b>Overall the loss of views across the Devil's Punch Bowl is as expected due to traffic diversion through the tunnel. Reduced congestion as expected. No lay-bys are included within the scheme, however there are facilities available both north and south of the scheme.</b>	<b>As stated for OYA</b>

**Table 5.11 - Summary of Effects on Journey Ambience**

Origin of Assessment	Summary of Effects on Journey Ambience	Assessment
AST	Large beneficial effect on driver stress, except for drivers in the tunnel. Large adverse effect on views from road. Slight beneficial effect with respect to traveller care (facilities) arising from the new dedicated footway/cycleway on sections of existing A3.	Slight Beneficial
EST	Overall the loss of views across the Devil's Punch Bowl is as expected due to traffic diversion through the tunnel. Reduced congestion as expected. No lay-bys are included within the scheme, however there are facilities available both north and south of the scheme	Slight Beneficial As expected

## Key Points from Environment

### Noise

- Based on traffic flows, it is likely that local noise impacts are generally better than expected or as expected; traffic flows have reduced more than predicted on the old A3, traffic on new A3 is higher than predicted but within the limitation for an as expected evaluation. Traffic redistribution on adjacent roads is generally less than expected.

### Local Air Quality

- Benefits for properties near the old A3 are better than expected due to lower traffic volumes. Whilst the old A3 and its feeder roads show varying impacts on traffic volumes, overall their impact is as expected or better than expected. The new A3 traffic flows are higher than predicted which results in a worse than expected effect for air quality.

### Greenhouse Gases

- At FYA, the scheme has resulted in an increase in 3,700 tonnes of carbon in the opening year over a geographical area consisting of the scheme extent only.

### Landscape and Townscape

- Mitigation measures generally provided in line with proposals.
- Establishment of vegetation within the trace of the old A3 through the Devil's Punch Bowl is poor with gorse further threatening this establishment. If this planting and heathland restoration continues to fail and maintenance/management does not improve is there a risk that the landscape objectives will not be met.
- General establishment of woodland planting along the old A3 south of Hazel Grove Junction and the new A3 is fair although grassland areas are being overrun by gorse and bramble.
- Townscape was as expected at OYA and scoped out at FYA.

### Biodiversity

- Along the old A3 trace within the Devil's Punch Bowl, there is a deterioration in the quality of the habitat, mainly due to soil pH, trampling and establishment of Gorse.
- There is a decrease in the species richness for invertebrates. Surveys indicate that the Dormouse population is stable. Breeding birds have shown mixed success with population increases in 29 species and decreases in 19 species. It is considered that the closure of the old A3 and an abundance of breeding habitat are the main contributory factors benefitting the number and distribution of the majority of bird species across the survey area and, in particular, within the 250m corridor of the closed A3.
- The presence of juvenile Slow-worm, Common Lizard and a sub-adult Grass Snake in Boundless Copse demonstrates that successful breeding of all three species is still occurring. The habitats created are suitable for reptiles and it is therefore considered that reptile populations have the potential to increase in the future.

### Cultural Heritage

- Cultural heritage was evaluated to be as expected at OYA; no aspects remained outstanding and it has been scoped out of this FYA report.

### Water

- Ponds appear not to be receiving vegetation maintenance which could compromise the effectiveness of their primary drainage function.

### Physical Fitness

- The scheme has resulted in a positive impact on most PROW especially within the Devil's Punch Bowl.

### **Journey Ambience**

- Diversion through the tunnel and bunding has reduced traveller views as expected although the views on the old A3 have remained south of the scheme as expected. There is an improvement in journey times on the A3, although journey times on minor roads and the A286 have not shown journey time savings as a result of the scheme. There has been a significant reduction in collisions since scheme opening. Both have contributed to a large beneficial assessment for driver stress. Variable Message Signs have been included as a part of the scheme which assists in reducing driver uncertainty. The existing A3 route has numerous lay-bys before and after the scheme. No new lay-bys are included within the scheme. Offsite care facilities are available along the route. Slight Beneficial assessment based on new dedicated footway/cycleway on sections of the old A3.

## 6. Accessibility and Integration

### Introduction

- 6.1. This section evaluates the impact of the scheme in terms of the accessibility and integration objectives; comparing qualitative forecast assessments from the scheme AST (as shown in Table A.1 in Appendix A) with post-opening findings and analysis of policy objectives.

### Accessibility

- 6.2. The accessibility objective is concerned with how the scheme has affected the ability of people in different locations to reach different types of facility, using any mode of transport. The accessibility objective consists of three sub-objectives. These are:

- Option values
- Access to the transport system
- Severance

### Option Values

- 6.3. Option Values, as defined in WebTAG relate to the availability of different transport modes within the study area, even if they are not used. For example, a car user may value a bus service along their route even if they never use it, because they have the option of another mode should their car become unavailable.
- 6.4. The AST forecast that the scheme would have a neutral impact on option values as it was unlikely that there would be change in availability of transport services in the area.
- 6.5. FYA opening there are still services that run through the A333 (former A3) that provide links to local destinations (Aldershot and Haslemere). These services will have benefited from improved reliability. The long-distance service Portsmouth to London will benefit from improved journey times. Two AM long distance services now stop at Hindhead, which is an increase from one service a day at the OYA stage.
- 6.6. The bus stop near the double mini-roundabout has improved waiting conditions for passengers as illustrated in Figure 6.1. The improved A3 is prohibited for NMUs between the junctions at Thursley and Hazel Grove, so as the RSA 4 noted, that the bus stops south of the Thursley junction had no safe pedestrian access. However, these are in rural locations where there is little demand for the service.

**Figure 6.1 - Bus stop on A333 (former A3) in Hindhead**



6.7. Whilst there is the option to use bus services in line with the guidance, the area has high levels of car ownership and low levels of bus usage, therefore the impact on option values is neutral as predicted.

### Access to the transport system

6.8. This sub-objective assesses access to the transport system based on two key variables; availability of a vehicle for private use, and the proximity to a public transport service.

6.9. There has been a minimal change to access to the transport system as a result of the scheme and therefore, similar to option values, the forecast impact was neutral and the outturn evaluation is likewise.

### Severance

6.10. Community severance refers to the degree to which movement and activities within the community are affected by the presence of a major road or other transport link, and particularly the degree of separation of residents from the facilities and services they use within their community.

6.11. Assessment of the impacts of this scheme on severance are based on the areas:

- Beacon Hill village – lies north of A287 Tilford Road.
- Hindhead village – centred around crossroads, hence was severed by the former A3 and A287.
- Grayshott village – lies north of former A3, and suffered from rat-runs for traffic avoiding the congestion.
- Nutcombe and High Pitfold, south of A3 and therefore severed from services in the larger Grayshott area by the A3.

6.12. Table 6.1 set out the locations where the scheme was predicted to have severance impacts and compares the forecast and observed impacts at these locations. Forecasts are based on the AST and the ‘Community Impacts’ chapter of the ES.

**Table 6.1 - Severance impacts**

Location	Forecast impact	Observed Impact at FYA
Hindhead crossroads, now double mini-roundabout  See Figure 6.2	Substantial reduction	<ul style="list-style-type: none"> <li>• Before the scheme was built, there was severe severance caused by high traffic flows and only a pedestrian phase on the crossing of the A3 south of the crossroads. In Hindhead, this meant difficult access to community facilities.</li> <li>• Severance has been much reduced five years after with a 50% reduction in traffic flows through this junction. Signalised crossings have also been provided on the three remaining through roads (A333 and A287 north and south).</li> <li>• Pedestrians can now more easily reach services.</li> </ul>

Location	Forecast impact	Observed Impact at FYA
A3 London Road, NE of former crossroads, now a dead-end route severed at the Devil's Punch Bowl Cafe.	Substantial reduction	<ul style="list-style-type: none"> <li>This road east of the crossroads, which formerly suffered severe congestion, is now severed to through traffic thus there is a substantial reduction, in traffic which is as predicted. The street environment on this section of the road has been made more attractive to pedestrians including widening of pavements, tree planting and removal of barriers and traffic lights.</li> <li>At OYA there were anecdotal reports of traffic still trying to use this road due to satellite navigation errors, it is expected at FYA that this has reduced as gadgets have been replaced or updated.</li> </ul>
Rat runs on minor roads, especially B3002 Headley Road in Grayshott	Substantial reduction	<ul style="list-style-type: none"> <li>Severance which was caused by high levels of rat run traffic has reduced on many routes, however there has been slightly more rat running at some locations.</li> <li>B3002 Headley Road shows reduced traffic in the centre of Grayshott (site 12) but shows a slight increase next to A333 (site 19).</li> </ul>
Nutcombe, Crossways Road near the A3 and on the A287 Hindhead Road	Slight disbenefit	Additional traffic at OYA caused a slight disbenefit on Crossways Road near the A333, however at FYA there appears to be a reduction in the level of traffic, in line with most other rat run routes in the villages.
New route of A3		<ul style="list-style-type: none"> <li>New severance caused by new route has been mitigated through design.</li> <li>NMU crossing points have been built, as mapped in Figure 1.4.</li> <li>Pedestrians and cyclists are not permitted on new section of the A3 which including the tunnel.</li> <li>The bypassed old road, now the A333, has been improved for NMUs through a reduction in traffic and widening and conversion of footpath to shared use in Hindhead.</li> <li>Before the scheme was built, although pedestrians and cyclists were permitted to use the former route of the A3 north of the crossroads around the Devil's Punch Bowl, the traffic conditions on the route caused substantial severance, deterring many users. There is now an off-road cycle route linking Hindhead and Thursley.</li> <li>Further assessment of the impacts of the scheme on NMUs is covered under the physical fitness sub-objective in paragraph 5.125.</li> </ul>

6.13. From the impacts detailed in Table 6.1, it is concluded that the overall impact on severance in the nearby communities is moderate beneficial, as expected.

**Figure 6.2 - Before and After Views of London Road from Former Crossroads**



## Integration

6.14. The integration objective consists of two main elements:

- Interchange with other transport modes: how the scheme assists different modes of transport in working together and the ease of people moving between them to choose sustainable transport choices.
- Land Use Policy and Other Government Policies: how the scheme integrates with local land use and wider government objectives.

## Transport Interchange

6.15. The AST forecast no impact on this sub-objective.

6.16. With regard to highway schemes, this sub-objective is only applicable in certain cases where an interchange between different modes forms part of the scheme, such as a park and ride facility; therefore this scheme has no impact on this sub-objective and has not been evaluated.

6.17. It is noted however that operators of the ferry services from Portsmouth to Isle of Wight and northern France now advertise that the improvements made to the A3 by this scheme mean that the ferry service now has easier access from London.

## Land Use Policy and Other Government Policies

6.18. The AST scored the impact of the scheme on land use policy as beneficial reasoning that: 60 policies would be supported, 8 policies hindered and 40 policies where adherence would be neutral.

6.19. The OYA evaluation report<sup>37</sup> (Table 6.2) provide a detailed evaluation of the scheme against local, regional and national policy, including severance, journey times, journey time reliability and improving safety.

6.20. In terms of the scheme's impact on land-use policies, the scheme aligns with some key policy documents including Waverley District Local Plan (2002) and East Hampshire District Local

<sup>37</sup> [http://assets.highways.gov.uk/our-road-network/pope/major-schemes/A3-Hindhead/POPE\\_\\_A3\\_HindheadOYA\\_Final\\_web\\_version.pdf](http://assets.highways.gov.uk/our-road-network/pope/major-schemes/A3-Hindhead/POPE__A3_HindheadOYA_Final_web_version.pdf) (accessed March 2017)

Plan (second review – 2006). The impact on land use policy is therefore deemed to be beneficial, as expected.

- 6.21. In relation to other government policies, the scheme largely aligns with national, regional and local policies, contributing towards improving severance, journey times, reliability and safety. However, traffic volumes on the A3 have increase and carbon has subsequently increase. The impact on other government policies is therefore considered to be neutral.

## Key Points from Accessibility and Integration

### Accessibility

#### Options values

- There have been some improvements to the bus services in the form of improved reliability, reduced journey times and a small increase in the number of bus services. The area has high levels of car ownership and low levels of bus usage and the impact is therefore neutral, as expected.

#### Severance

- Severance has reduced in certain locations (e.g. A3 Hindhead Crossroads) due to the reduced traffic volumes as a result of the scheme.
- Non-Motorised User crossing points have been built and improvements to the old A3 (now the A333) have been improved for NMUs through the conversion of a footpath to shared use.
- Prior to the scheme implementation, pedestrians and cyclists were not permitted to use the former A3 to the north of Devil's Punch Bowl, however following the scheme opening, there is now an off-road cycle route linking Hindhead to Thursley.

#### Access to the transport system

- There have been minimal changes to access to the transport system as a result of the scheme and therefore the outturn evaluation is neutral in line with the forecast impact.

### Integration

#### Transport interchange

- This is only applicable in certain cases where an interchange between different modes forms part of the scheme, such as a park and ride facility and therefore this scheme has no impact on this sub-objective and has not been evaluated.

#### Land use policy

- The scheme aligns with some key policy documents including Waverley District Local Plan (2002) and East Hampshire District Local Plan (second review – 2006). The impact on land use policy is deemed to be beneficial, as expected.

#### Other government policies

- The scheme largely aligns with national, regional and local policies, contributing towards improving severance, journey times, reliability and safety. However, traffic volumes on the A3 have increase and carbon has subsequently increase. The impact on other government policies is therefore considered to be neutral.

## 7. Conclusions

7.1. To conclude this report, this section summarises how the scheme is meeting its specified objectives.

### Scheme specific objectives

7.2. Table 7.1 presents an evaluation of the scheme's objectives using the evidence presented in this study.

**Table 7.1 - Summary of scheme objectives**

Objective	Has the scheme objective been achieved?	
Improve journey time reliability for users of the A3 and other roads.	Dualling of the A3 and removal of the crossroads has reduced congestion especially that seen at the peak periods, hence there is improved reliability.	✓
Improve Hindhead through the substantial reduction in through traffic and rat running on minor roads leading to improved local air quality, less noise, reduced severance of communities.	Substantial reductions in traffic on roads in Hindhead has been as forecast, leading to improvements in the environment in the village.	✓
Reduce the number of collisions	Numbers of collisions have reduced in the A3, in the local area around the old route and in the wider area.	✓
Remove the route of the A3 through the historic landscape of Hindhead Common and the Devil's Punch Bowl Site of Special Scientific Interest (SSSI) giving substantial environmental benefits for biodiversity and visitors	The former route through the Devil's Punch Bowl is providing substantial benefits for visitors to the site. Vegetation is establishing but continued issues with the heathland mosaic establishment and invasion by gorse species is limiting what could have been a great success – continued intensive maintenance by the National Trust will be required to achieve benefits for biodiversity.	✓ <sup>38</sup>
Minimise adverse environmental impacts including that to Wealden Heaths Phase 2 Special Protection Area such that there is an overall slight beneficial impact on the Surrey Hills Area of Outstanding Natural Beauty (AONB)	Increases in bird breeding in locations close to land over the former A3 has been attributed to the increase in available habitat and the decrease in levels of disturbance and traffic noise as a result of the scheme. Improved management of public access around the site has resulted in a reduction for the potential for disturbance of ground nesting birds. These effects have resulted in a significant improvement of the SPA for Annex 1 birds.	✓

<sup>38</sup> Partial replaced by tick, with a footnote as follows: Issues around maintenance, lack of establishment of heathland and gorse growth impacting new planting remain.

# Appendices

# **Appendix A. Appraisal Summary Table (AST) and Evaluation Summary Table (EST)**

**Table A.1 - Appraisal Summary Table (AST)**

Scheme Name: A3 Hindhead		Description: Dual 2-lane all-purpose bypass (6.7km) incl. bored tunnel (1.9km)	Problems: substantial delays and journey time variability on the A3 due to the traffic signals at Hindhead, the single carriageway sections either side and nearby junctions and accesses, also causing substantial amounts of 'rat-running' on local roads. Traffic flow 30,000veh/day (8% HGVs).	Scheme Total Cost: £371.5m. Present Value of Costs to Public Accounts = £239.3m	
OBJECTIVE	SUB-OBJECTIVE	QUALITATIVE IMPACTS		QUANTITATIVE MEASURE	ASSESSMENT
Environment	Noise	Substantial reduction in noise in parts of Hindhead. Tranquillity would be restored to a large area within Hindhead Common and The Devil's Punch Bowl. Some effects from redistributed traffic on existing roads.		People annoyed by noise - Published Scheme vs. Do Minimum 2027 Total population in assessment over 1750. Do Minimum 307 annoyed Published Scheme 272 annoyed	Estimated population annoyed by noise would be reduced by 35
	Local Air Quality	No AQMA currently exists for Hindhead. No air quality limit values will be exceeded in the opening year. For most roads affected by changes in traffic there is likely to be an air quality improvement at residential properties. Only a few roads will experience deterioration in air quality. This deterioration is not considered significant.		Properties where LAQ improves 2980...worsens 150 LAQ improves significantly PM <sub>10</sub> 0NO <sub>2</sub> 210 LAQ worsens significantly PM <sub>10</sub> 150NO <sub>2</sub> 150	LAQ index  NO <sub>2</sub> = - 1079 PM <sub>10</sub> = -342
	Greenhouse Gases	Traffic related CO <sub>2</sub> emissions within the study area are predicted to increase by 8.2% in 2009 compared to 2002. The Published Scheme will result in a further 5.9% increase. The total increase being comparable with the projected national increase from the transport sector.		Increase in CO <sub>2</sub> with Published Scheme compared to Do Minimum	7 kilotonnes / annum
	Landscape	The large but relatively local adverse landscape effects within Tyndall's Wood and Boundless Copse have to be considered in relation to the greater beneficial impacts upon the high quality and very highly valued landscape within the Devil's Punch Bowl and Hindhead Common. Whilst the balance would be fine in the opening year before landscape mitigation measures help to reduce impacts, the collective longer-term landscape impact would be slightly beneficial due to the removal of the Existing A3 from the Devil's Punch Bowl, the routing of traffic through the tunnel and the enclosure of the Existing A3 corridor on the ridgeline north of Boundless Copse to Thursley.		N/A	Slight Beneficial
	Townscape	The removal of through traffic from the closed section of London Road to the north of the Hindhead Crossroads would significantly improve the quality of the local townscape and would outweigh minor impacts on Crossways Road and Tower Road associated with the potential implementation of local traffic calming measures. Overall, the townscape impact would be moderate beneficial, although any benefits would be large beneficial should streetscape improvements be implemented along the closed section of London Road following the completion of the main scheme.			Moderate Beneficial
	Heritage of Historic Resources	No impacts on designated sites. Impact on small proportions of locally and regionally important archaeology and historic elements of the landscape. Some risk to unknown/undiscovered archaeology. Neutral or moderate beneficial effect on the settings of listed buildings and structures and the area of the Devil's Punch Bowl, because of the removal of the A3 and reduced traffic intrusion.		N/A	Slight Adverse
	Biodiversity	Small adverse direct impact on adjacent Wealden Heath SPA/Devil's Punch Bowl SSSI through construction activities. Very small adverse impacts on international / national nature conservation interest due to increased passing traffic. Direct adverse impact on areas of non-designated woodland and Woodlands East of Hindhead SNCI. Large beneficial impact on Wealden Heaths SPA / Devil's Punch Bowl SSSI due to removing the existing A3 road and restoring carriageway to heathland.		N/A	Moderate Beneficial
	Water Environment	Road and tunnel would be constructed above groundwater level and therefore would have insignificant impact on groundwater movement, springs or public and private abstractions. Road runoff would be collected in a positive drainage system, and appropriate methods of treatment provided prior to discharge to either streams or groundwater. This would improve the existing situation where road run off is discharged without treatment, and would remove polluting discharges to ecologically sensitive Devil's Punch Bowl		N/A	Moderate Beneficial
	Physical Fitness	Relatively few pedestrians currently cross the Existing A3 in Hindhead (less than 200a day). Reduced traffic severance in Hindhead resulting from the Published Scheme may encourage more pedestrian and cyclist trips. The provision of dedicated cycle routes and a tunnel which will reunite severed sections of Hindhead Common are likely to encourage greater recreational use.		No data available on number of pedestrians / cyclists who will walk or cycle for more than, or less than, the 30mins a day health threshold.	Moderate Beneficial
	Journey Ambience	Large beneficial effect on driver stress, except for drivers in the tunnel. Large adverse effect on views from road. Slight beneficial effect with respect to traveller care (facilities) arising from the new dedicated footway/cycleway on sections of existing A3.		About 36,000 road users a day in 2009 affected.	Slight Beneficial
Safety	Accidents	Substantial reductions in numbers of accidents.		Accidents reduced by 28 in 2012 rising to 35 in 2027. 60-year reduction 2021.	PVB = £113m 16% of total PVB
	Security	N/A		N/A	N/A
Economy	Public Accounts	Central government costs only, including investment and operating costs.		Central Government PVC	PVC = 239m
	Business Users & Providers	Large benefits to freight operators			PVB = £276m
	Consumer Users	Substantial travel time savings, which increase significantly with high traffic growth due to large levels of traffic congestion over a wide area.			PVB = £240m
	Reliability	Moderate reduction in travel time variability on the A3 and most side roads from bypassing of Hindhead Crossroads and separating through and local traffic. Slight reduction in travel time reliability on A287 from reduced traffic throughput at Hindhead Crossroads.		AADT to 'Congestion Reference Flow' ratio for the A3 reduces from 1.16 to 0.67 (excludes junction congestion)	Moderate beneficial
	Wider Economic Impacts	No regeneration area directly affected by the Scheme. South Hampshire could benefit from the improved transport connection. The blighted part of Hindhead should recover when relieved of major traffic flows.		N/A	Moderate Beneficial
Accessibility	Option values	Unlikely there would be substantial changes to the availability of transport services in the area.			Neutral
	Severance	Substantial reduction of community severance at Hindhead crossroads providing substantial relief on the A3 North (London Road). Slight new severance created for the residents around Nutcombe, Crossways Road near the A3 and on the A287 Hindhead Road. Substantial reduction of rat running traffic movements.			Moderate beneficial
	Access to the Transport System	No change		N/A	Neutral
Integration	Transport Interchange	No change		N/A	Neutral
	Land-Use Policy	Across the relevant national, regional and local policies (transport, land use, noise and vibration, air quality, water, nature conservation and biodiversity, cultural heritage and archaeology, landscape, geology, soils and contaminated land and waste, community effects) there would be more policies supported than hindered. The Published Scheme performs well against planning policy particularly with respect to improved safety measures, road capacity and environmental protection measures.		60 policies supported, 8 policies hindered and 40 policies where adherence would be neutral.	Beneficial
	Other Government Policies	N/A		N/A	N/A

**Table A.2 - Evaluation Summary Table (EST)**

OBJECTIVE	SUB-OBJECTIVE	QUALITATIVE IMPACTS	QUANTITATIVE IMPACT	ASSESSMENT
Environment	Noise	Based on traffic flows along the old A3 and its connecting routes, it is likely that there has been an improvement in most areas, and neutral in others. Traffic flows along the A3 are as expected.	-	Overall, better than expected or as expected along offline route. As expected along the new A3 and surrounding receptors.
	Local Air Quality	Based on traffic flows along the old A3 and its connecting routes, it is likely that there has been an improvement in air quality in some areas, neutral in others and a significant worsening for two routes which includes the A3.	-	As expected or better than expected along offline routes except one location which is worse than expected. Worse than expected along the new A3 and surrounding receptors.
	Greenhouse Gases	An increase in carbon is observed post opening, slightly higher than forecast due to increased traffic flows. Note – this is a different area assessment to that used in the AST and does not account for any reduction in traffic on other roads. Hence this is likely to be an overestimate for the appraisal area as a whole.	7,600 tonnes carbon	Worse than expected (for A3 only)
	Landscape	Planting in the Devil's Punch Bowl is not at the growth level or species diversity and colonisation expected at FYA although there is a direct benefit of the removal of the old A3 from this area. Planting along the old alignment between Hazel Grove Junction and Hammer Lane minor underpass has progressed well, although gorse is threatening this growth in some areas. Woodland planting along the new A3 alignment is showing good growth in most areas. However, gorse is colonising large areas of the soft estate and appears to be unmanaged. Overall, maintenance is the largest risk to the success of the landscape planting with all areas being threatened by gorse.	Slight beneficial	Worse than expected
	Townscape	Traffic volumes at Grayshott and Hindhead have generally reduced significantly, reducing the adverse impact of peak hour traffic volumes.	Moderate beneficial	As expected
	Heritage of Historic Resources	No further assessment undertaken, assumed to be as expected.	Slight adverse	As expected
	Biodiversity	New habitats of woodland, scrub, hedgerow, and heather, wet flush and species-rich grassland have been created as part of the landscaping works as expected. Overall, there is a mixed success on species monitored as a part of the aftercare programme with positive effects on dormice and breeding birds and negative effect on invertebrates and reptiles. Overall, planting is considerably worse than expected along the old A3 and new A3 alignment impacting on habitat as a whole.	Moderate beneficial	Worse than expected
	Water Environment	No information has been received by POPE on the functional elements of water quality and drainage. However, the apparent lack of maintenance within pond sites does bring in to question whether these elements of the scheme are working as intended.	Moderate beneficial	Worse than expected
	Physical Fitness	The scheme has resulted in a positive impact on most PROW. There is greater use of main pathways through the Devil's Punch Bowl.	Moderate beneficial	As expected
	Journey Ambience	Overall the loss of views across the Devil's Punch Bowl is as expected due to traffic diversion through the tunnel. Reduced congestion as expected. No lay-bys are included within the scheme, however there are facilities available both north and south of the scheme.	Slight beneficial	As expected
Safety	Accidents	5.6 collisions per annum have been saved in the modelled area since the scheme opened. It is noted that the RSA recommended options for treatment relating to night-time collisions and loss of control. These treatments included drainage options, reflectivity of lining and studs and improvements, where necessary, however the status of these recommended options is currently unknown.	PVB = £5.2 million	Worse than expected
	Security	The new CCTV, provision of laybys, reduced journey times on the new and old A3 which is in addition to the improvement of safety perceptions evidenced by the OYA residents' survey, results in the scheme having a slight beneficial impact on security.	Slight beneficial	-
Economy	Public Accounts	Investment cost provided by Regional Finance Manager. Outturn investment cost is generally in line with forecast.	PVC = £371 million excl. indirect tax	As expected
	Transport Economic Efficiency	There are substantial travel time savings for business and consumer users on A3. This along with higher than forecast traffic volumes results in journey time benefits being larger than forecast.	PVB = £809 million	Better than expected
	Reliability	Route stress metric shows reduction from 125% to 75%	-	Better than expected
	Wider Economic Impacts	South Hampshire will benefit from reduced journey times and improved reliability on the A3, the key strategic link between South Hampshire, Portsmouth and the M25.	Moderate beneficial	As expected
Accessibility	Options Values	There have been some improvements to the bus services in the form of improved reliability, reduced journey times and a small increase in the number of bus services. The area has high levels of car ownership and low levels of bus usage and the impact is therefore neutral, as expected.	Neutral	As expected
	Severance	Severance has reduced in certain locations (e.g. A3 Hindhead Crossroads) due to the reduced traffic volumes as a result of the scheme. Non-Motorised User crossing points have been built and improvements to the old A3 (now the A333) have been improved for NMUs through the conversion of a footpath to shared use. Furthermore, prior to the scheme implementation, pedestrians and cyclists were not permitted to use the former A3 to the north of Devil's Punch Bowl, however following the scheme opening, there is now an off-road cycle route linking Hindhead to Thursley.	Moderate beneficial	As expected
	Access to the Transport System	There has been a minimal change to access to the transport system as a result of the scheme.	Neutral	As expected
Integration	Transport Interchange	This sub-objective is only applicable in certain cases where an interchange between different modes forms part of the scheme, such as a park and ride facility and therefore this scheme has no impact on this sub-objective and has not been evaluated. It is noted however that operators of the ferry services from Portsmouth to Isle of Wight and northern France now advertise that the improvements made to the A3 by this scheme mean that the ferry service now has easier to access from London.	Not applicable	Not applicable
	Land-Use Policy	The scheme aligns with some key policy documents including Waverley District Local Plan (2002) and East Hampshire District Local Plan (second review – 2006). The impact on land use policy is therefore deemed to be beneficial.	Beneficial	As expected
	Other Government Policies	The scheme largely aligns with national, regional and local policies, with the exception of increase traffic volumes and the subsequent increase in carbon. The impact on other government policies is therefore considered to be neutral.	Neutral	-

## Appendix B. Environmental Data

### B.1. Environmental documents received

**Table B.1 - Standard list of information required to evaluate the environmental sub-objective**

Requested Information	Response
Environmental Statement	Received ES, figures and technical reports
AST	Received
Any amendments/ updates/addendums etc to the ES or any further studies or reports relevant to environmental issues. Have there been any significant changes to the scheme since the ES.	None required
'As Built' drawings for landscape, ecological mitigation measures, drainage, fencing, earthworks etc. Preferably electronically or on CD.	Received ecology, landscape, drainage and earthworks asbuilts
Contact names for consultation	Received from the pre-scheme assessment
Archaeology - were there any finds etc. Have any Archaeological reports been written either popular or academic and if so are these available?	Post-excavation Assessment Report and Proposals for Analysis and Final Publication (February 2011)
Have any properties been eligible for noise insulation?	No final information indicating installed insulation received, only proposed assessments
Has any post opening survey or monitoring been carried out e.g. for ecology/biodiversity or water quality and if so would copies of the reports be available?	Landscape and ecology monitoring undertaken
Animal Mortality Data	One mortality received from MAC
Any publicity material	Material obtained from website
Pre scheme Non Motorised User (NMU) Audit or Vulnerable User Survey	None received
Copy of NMU post opening survey	None received
Employers Requirements Works Information - Environment sections	Received
Health and Safety File – Environment sections	None received
Construction Environment Management Plan (CEMP)	None received
Landscape and Ecology Aftercare Plan (LEAP) and / or Landscape and Ecology Management Plan (LEMP)	Received
Handover Environmental Management Plan (HEMP)	None received
Monitoring report (ecology, landscape)	Received
The Road Surface Influence (RSI) value of any low noise surface installed	Received

## Appendix C. Glossary

Term	Definition
<b>AADT</b>	<b>Annual Average Daily Traffic.</b> Average of 24 hour flows, seven days a week, for all days within the year.
<b>Accessibility</b>	<b>Accessibility</b> can be defined as 'ease of reaching'. The accessibility objective is concerned with increasing the ability with which people in different locations, and with differing availability of transport, can reach different types of facility.
<b>AGLV</b>	<b>Area of Great Landscape Value</b>
<b>AMCB</b>	<b>Analysis of Monetised Costs and Benefits</b>
<b>AONB</b>	<b>Area of Outstanding Natural Beauty</b>
<b>AQMA</b>	<b>Air Quality Management Area</b>
<b>AST</b>	<b>Appraisal Summary Table.</b> This records the impacts of the scheme according to the Government's five key objects for transport, as defined in DfT guidance contained on its Transport Analysis Guidance web pages, WebTAG.
<b>ATC</b>	<b>Automatic Traffic Counter</b>
<b>AWT</b>	<b>Average Weekday Traffic.</b> Average of Monday to Friday 24 hour flows.
<b>BAP</b>	<b>Biodiversity Action Plan</b>
<b>BCR</b>	<b>Benefit Cost Ratio.</b> This is the ratio of benefits to costs when both are expressed in terms of present value i.e. PVB divided by PVC.
<b>BOAT</b>	<b>Byway Open to All Traffic.</b> A special category of way recorded on Definitive Maps. It is a carriageway and therefore a right of way for vehicular traffic, but one which is mainly used by walkers and horse riders.
<b>CO<sub>2</sub></b>	<b>Carbon Dioxide.</b> For transport, this is the main greenhouse gas.
<b>COBA</b>	<b>Cost Benefit Analysis.</b> A computer program which compares the costs of providing road schemes with the benefits derived by road users (in terms of time, vehicle operating costs and accidents), and expresses the results in terms of a monetary valuation. The COBA model uses the fixed trip matrix unless it is being used in Accident-only mode.
<b>CRF</b>	<b>Congestion Reference Flow</b>
<b>DfT</b>	<b>Department for Transport</b>
<b>Discounting</b>	Discounting is a technique used to compare costs and benefits that occur in different time periods and is the process of adjusting future cash flows to their present values to reflect the time value of money, e.g. £1 worth of benefits now is worth more than £1 in the future. A standard base year needs to be used which is 2002 for the appraisal used in this report.
<b>DM</b>	<b>Do Minimum.</b> In scheme modelling, this is the scenario which comprises the existing road network plus improvement schemes that have already been committed.
<b>DMRB</b>	<b>Design Manual for Roads and Bridges.</b> Manual system with current standards, advice notes and other documents relating to the design, assessment and operation of trunk roads and motorways.
<b>DS</b>	<b>Do Something.</b> In scheme modelling, this is the scenario detailing the planned scheme plus improvement schemes that have already been committed.
<b>EA</b>	<b>Environment Agency</b>
<b>EAR</b>	<b>Economic Assessment Report</b>
<b>ECI</b>	<b>Early Contractor Involvement</b>
<b>ES</b>	<b>Environmental Statement</b>
<b>EST</b>	<b>Evaluation Summary Table.</b> In POPE studies, this is a summary of the evaluations of the TAG objectives using a similar format to the forecasts in the AST.
<b>FWI</b>	<b>Fatalities and Weighted Injuries</b>

<b>FWI/bvkm</b>	This figure is a combined measure of casualties based on the numbers of fatal, serious and slight casualties. It is weighted by severity of injuries, with fatalities having the highest weighting. It can be expressed as a ratio per accident, per year or based on the amount of travel (bvkm, billion vehicle kilometres).
<b>FYA</b>	<b>Five Years After</b>
<b>HEMP</b>	<b>Handover Environmental Management Plan</b>
<b>HGV</b>	<b>Heavy Goods Vehicle.</b> In the context of this report, the precise definition of the term is dependent on the way that traffic is being measured. Currently, traffic flow data as measured by ATCs uses a length based classification – the term HGV is used to refer to vehicles greater than 5.2m. Shorter vehicles are classified as 'light'.
<b>ITR</b>	<b>Indirect Tax Revenue</b>
<b>KSI</b>	<b>Killed or Seriously Injured.</b> KSI is the proportion of casualties who are killed or seriously injured and is used as a measure of accident severity.
<b>LEMP</b>	<b>Landscape and Ecology Management Plan</b>
<b>MAC</b>	<b>Managing Agent Contractor.</b> Organisation normally contracted in 5-year terms for undertaking the management of the road network within a Highways England area.
<b>MoD</b>	<b>Ministry of Defence</b>
<b>Moving observer method</b>	Method of surveying journey times using multiple trips of vehicles following the average speed of the traffic.
<b>mvkm</b>	<b>Million Vehicle Kilometres</b>
<b>NT</b>	<b>National Trust.</b> Conservation organisation in England, Wales and Northern Ireland.
<b>NMU</b>	<b>Non-Motorised User.</b> A generic term covering pedestrians, cyclists and equestrians.
<b>NO<sub>2</sub></b>	<b>Nitrogen Dioxide</b>
<b>NRTF</b>	<b>National Road Traffic Forecast.</b> This document defines the latest forecasts produced by the Department of the Environment, Transport and the Regions of the growth in the volume of motor traffic. At the time this scheme was appraised, the most recent one was NRTF97, i.e. dating from 1997.
<b>NTEM</b>	<b>National Trip End Model.</b> This forecasts the growth in trip origin-destination for use in transport modelling, taking into account national projections of population, employment, housing, car ownership and trip rates.
<b>NTM</b>	<b>National Transport Model</b>
<b>OYA</b>	<b>One Year After</b>
<b>PIC</b>	<b>Personal Injury Collision.</b> A road traffic collision in which at least one person required medical treatment.
<b>PICG</b>	Highways England's <b>Project Investment Control Group</b>
<b>POPE</b>	<b>Post Opening Project Evaluation.</b> Before and after monitoring of all major highway schemes in England.
<b>PM<sub>10</sub></b>	<b>Particulate Matter measuring less than 10µm.</b> This is the generally accepted measure of particulate material in the atmosphere likely to be inhaled by humans.
<b>Present Value</b>	<b>Present Value.</b> The value today of an amount of money in the future. In cost-benefit analysis, values in differing years are converted to a standard base year by the process of discounting giving a present value.
<b>PROW</b>	<b>Public Right of Way</b>
<b>PTI</b>	<b>Planning Time Index.</b> Metric by which reliability is measured that is designed to indicate how much additional time road users need to allow to ensure they arrive on time, and highlights roads where very slow journeys are encountered. It is based on the amount of time road users would need to leave for a journey to be 95% confident of arriving on time, and therefore the measure is the ratio of the 95th percentile journey time to

	the free-flowing journey time.
<b>PVB</b>	<b>Present Value Benefit.</b> Value of a stream of Benefits accruing over the appraisal period of a scheme expressed in the value of a Present Value.
<b>PVC</b>	<b>Present Value Cost.</b> As for PVB but for a stream of costs associated with a project.
<b>RSA</b>	<b>Road Safety Audit.</b> An evaluation of a highway improvement scheme during design, at the end of construction and post-construction, to identify road safety problems and to suggest measures to eliminate or mitigate any concerns.
<b>SATURN</b>	<b>Simulation and Assignment of Traffic to Urban Road Networks.</b> Traffic assignment suite of programs designed to assess urban road networks where intersection capacity drives the network capacity.
<b>SCC</b>	<b>Surrey County Council</b>
<b>SNCI</b>	<b>Site of Nature Conservation Importance</b>
<b>SPA</b>	<b>Special Protection Area.</b> Area classified by the UK Government under the EC Birds Directive. SPAs are areas of the most important habitat for rare and migratory birds within the European Union.
<b>SSSI</b>	<b>Site of Special Scientific Interest</b>
<b>STATS19</b>	Record of injury accident statistics recorded by police officers attending accidents.
<b>TEE</b>	<b>Transport Economic Efficiency</b>
<b>TEMPro</b>	<b>Trip End Model Presentation Program.</b> A software which allows users to view travel forecasts from the National Trip End Model (NTEM) datasets.
<b>TUBA</b>	<b>Transport Users Benefit Appraisal.</b> A DfT transport economic appraisal software used for the assessment of economic benefits other than safety.
<b>VISSIM</b>	Microscopic multi-modal traffic flow simulation software package.
<b>VOC</b>	<b>Vehicle Operating Cost</b>
<b>vpd</b>	<b>Vehicles per day</b>
<b>WebTRIS</b>	Highways England traffic count data.

# Appendix D. Tables and Figures in this Report

## Tables

Table 1.1 - History of key dates	12
Table 2-1 - Site locations	15
Table 2.2 - Traffic flows across the strategic area screenline	23
Table 2.3 - Local area screenline – north of A3	24
Table 2.4 - Local area screenline – south of A3	25
Table 2.5 - Forecasts vs. observed data: without scheme (AADT, DM, ADT, and Observed)	29
Table 2.6 - Traffic flow forecasts vs. observed data: with scheme (AADT, DS)	30
Table 2.7 - Journey Times: A3 route between A31 and A325	32
Table 2.8 - Journey Times: A287 Route	32
Table 2.9 - Journey time savings between Milford and Liphook	34
Table 2.10 - Route Stress on A3	36
Table 3.1 - Calculation of the counterfactual used in this evaluation	39
Table 3.2 - Collision analysis for COBA area	41
Table 3.3 - Casualty analysis for COBA area	42
Table 3.4 - Collision analysis for the scheme section and A3 Hindhead	43
Table 3.5 - Casualty analysis for scheme section & A3 Hindhead	44
Table 3.6 - Forecast vs. observed collision savings	47
Table 3.7 - Collision rates on the A3 trunk road (unadjusted)	48
Table 3.8 - Statistical significance of change in collision numbers and rates	49
Table 3.9 - FWI on the improved section of the A3	49
Table 4.1 – Economic impact of scheme	55
Table 4.2 – Forecast TEE benefits	56
Table 4.3 - Vehicle hour savings	56
Table 4.4 – Journey time benefits: Forecast vs. Outturn	57
Table 4.5 – Forecast and reforecast VOC	58
Table 4.6 - Outturn Economic Evaluation of Safety Benefits	59
Table 4.7 – Summary of forecast and observed PVB	60
Table 4.8 - Indirect tax as Present Value (£m)	61
Table 4.9 - Scheme Costs (£m)	62
Table 4.10 - Investment Costs as Present Value (£m)	62
Table 4.11 - Forecast Maintenance and Operating Costs (£m)	63
Table 4.12 - Summary of Present Value Costs (£m)	63
Table 4.13 – Benefit Cost Ratio (£m)	64
Table 5.1 - Summary of environmental consultation responses	68
Table 5.2 - With the scheme (2016) traffic flows: Observed vs. Forecast	71
Table 5.3 - Summary of Effects on Noise	74
Table 5.4 - Summary of Effects on Air Quality	75
Table 5.5 – Greenhouse gases (tonnes of carbon) impact on the A3	76
Table 5.6 - Summary of Effects on Landscape and Visual Evaluation	86
Table 5.7 - Summary of Effects on Biodiversity	94
Table 5.8 - Summary of Effects on Water	97
Table 5.9 - Summary of Effects on Physical Fitness	100
Table 5.10 - Summary of journey ambience evaluation	102

Table 5.11 - Summary of Effects on Journey Ambience	103
Table 6.1 - Severance impacts	107
Table 7.1 - Summary of scheme objectives	111

## Figures

Figure 1.1 - Location of scheme	7
Figure 1.2 - Aerial view of route of A3 in 2007, before start of construction	8
Figure 1.3 - Key features of scheme	9
Figure 1.4 - Features of scheme for non-motorised users (NMUs)	10
Figure 2.1 - Regional and national traffic flow trends since start of construction (2007)	16
Figure 2.2 - Long term trend in traffic flow on A3 (south of scheme), before, during and after construction of A3 Hindhead scheme	17
Figure 2.3 - Average Weekly Traffic (AWT) - scheme and immediate vicinity	20
Figure 2.4 - Traffic changes in the wider area	21
Figure 2.5 - Location of strategic area screenline sites	22
Figure 2.6 - Locations of sites in local area screenlines	24
Figure 2.7 - A3 northbound (Site B) average weekday traffic flow by hour	26
Figure 2.8 - A3 southbound (Site B) average weekday traffic flow by hour	26
Figure 2.9 - Modelled area	28
Figure 2.10 - Journey time analysis routes	31
Figure 2.11 - A3 journey times: forecast vs. observed AM peak - northbound	34
Figure 2.12 - A3 journey times: forecast vs. observed IP – northbound	34
Figure 2.13 - A3 journey times: forecast vs. observed PM – southbound	35
Figure 3.1 - Scheme study area (COBA, wider area) and A3 & Hindhead area (narrower area)	40
Figure 3.2 - Before scheme opening collision locations by severity	45
Figure 3.3 - After scheme opening collision locations by severity	46
Figure 3.4 - Emergency lay-bys and CCTV, Google 2017 ©	52
Figure 5.1 - Key environment references	69
Figure 5.2 – Along northern side of scheme showing bunding and environmental barrier (OYA view first, with FYA below)	72
Figure 5.3 - Environmental barriers screening properties near Spaniard junction	73
Figure 5.4 - Planting plots within the old alignment	79
Figure 5.5 - Maintenance of planting pots	79
Figure 5.6 - The Devil’s Punchbowl – view comparisons – before construction, illustrative view by year 15 and actual view at FYA (Summer)	80
Figure 5.7 - Hammer Lane minor underpass	80
Figure 5.8 - Gorse establishing on footpaths	81
Figure 5.9 - Hazel Grove junction	81
Figure 5.10 - Plant progress southbound near Hazel Grove junction (OYA view on the left, with FYA on the right)	82
Figure 5.11 - Northbound off slip at Hazel Grove junction (OYA view on the left, with the FYA view on the right)	82
Figure 5.12 - View from Miss James Bridge towards the south portals (OYA view first, with FYA below)	82
Figure 5.13 - Species rich for steep slopes mix on the slopes of the southern portal entrance to the tunnel (OYA view on the left, with the FYA on the right)	83
Figure 5.14 - Canadian Memorial site showing a Maple tree in the background (OYA view on the left, with the FYA view on the right)	83
Figure 5.15 - Further Gorse Establishment	84
Figure 5.16 - Gorse blocking views	85

Figure 5.17 - Heathland vegetation yet to establish	86
Figure 5.18 - Miss James Footbridge facing east (OYA view on the left, with the FYA view on the right)	93
Figure 5.19 - Dormouse bridge near Miss James overbridge (OYA view on the left, with the FYA view on the right taken from the opposite side of the dormouse bridge)	93
Figure 5.20 - One-way mammal gate (OYA view on the left, with the FYA view on the right)	94
Figure 5.21 - Pond I showing establishment of reed beds at OYA and complete overgrowth at FYA (OYA view on the first, with FYA below)	96
Figure 5.22 - Pond I had not been completed at the time of the OYA site visit and the subject of excess soil storage at FYA (OYA view on the left, with the FYA view on the right)	96
Figure 5.23 - Pond H showing successful establishment of species-rich sward at OYA on the left, however at FYA on the right overgrown	97
Figure 5.24 - Entrance to the northern start of the public right of way known as BOAT 500	99
Figure 5.25 - Public right of way through the Devil's Punch Bowl following the alignment of the old A3100	
Figure 5.26 - Bridleway underpass access to High Pitfold from Portsmouth Road. (OYA view on the left, with the FYA view on the right)	100
Figure 6.1 - Bus stop on A333 (former A3) in Hindhead	106
Figure 6.2 - Before and After Views of London Road from Former Crossroads	109

## Appendices Tables and Figures

Table A.1 - Appraisal Summary Table (AST)	114
Table A.2 - Evaluation Summary Table (EST)	115
Table B.1 - Standard list of information required to evaluate the environmental sub-objective	116